WTCI-127-P

PORT AUTHORITY OF NY & NJ

WORLD TRADE CENTER

MANDATED
Fire Alarm Guidelines

SIEMENS
Cerberus Division
Special Projects Group/WTC

1-800-834-3843
Option (1)
For Design Services

WTC Base Building Fire Alarm System
Design, Construction, Maintenance &
Technical Support Services

March, 1999

Introduction

The World Trade Center Base Building Fire Alarm Systems protect the 12 Million Square Feet of Facilities that make up the WTC Complex. Each system has been designed, installed and tested subject to a set of building standards which insure uniformity, compatibility and functionality.
This guideline manual is a compilation of those building standards.

This guideline manual is intended as a resource to the Fire Alarm Design Engineer tasked with interfacing to the WTC Base Building Fire Alarm System. No document, regardless of how well intended can provide every answer, in those instances ask questions before making assumptions. These guidelines do not relieve the Professional Engineers responsibility to provide an operational, code compliant design which fulfills the Fire Protection requirements of the World Trade Center.

This guideline manual is applicable to the WTC Class E Base Building Fire Alarm Systems installed at 1 & 2 World Trade Center.

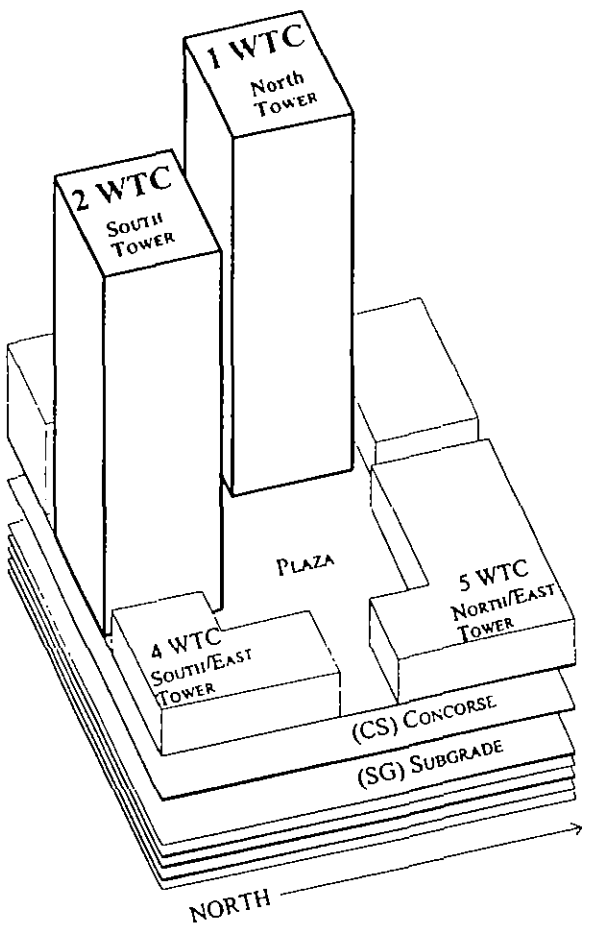


FIGURE 1 - WTC COMPLEX

Terms, Definitions and General Information

This Page describes the various abbreviations and terminology utilized on Drawings, Specifications and other Documents. In general this is the "language" which allows the designers, engineers, installers, technicians, inspectors and users to communicate effectively.

WTC	World Trade Center	The physical complex located in Manhattan, NYC
BBFA	Base Building Fire Alarm System	The Core Fire Alarm System at the WTC also referred to as the "Class E System"
PANYNJ	Port Authority of NY & NJ	The Owner and Authority having Jurisdication.
NYC-MEA	NYC - Materials/Equipment Approval	The Listing Requirements all Fire Alarm System must achieve.
NYCBC	New York City Building Code	The Code Requirements all Fire Alarm Systems must achieve
CSD	Siemens / Cerberus Division	The BBFAS Manufacturer, Vender and Maintainer.
MXLV	Integrated Fire/Evac System	The Model of the BBFAS Systems.
NT	North Tower	1 World Trade Center Building - 110 Stories
ST	South Tower	2 World Trade Center Building - 110 Stories
SE	Southeast Plaza	4 World Trade Center - 9 Stories
NE	Northeast Plaza	5 World Trade Center - 9 Stories
CS	Concourse (310 Level)	Indoor Shopping Mall - 1 Story
SG	Subgrade	Parking, Utilities, Storage - 6 Levels Below Grade
FCS	Fire Command Station	The primary Fire Command Location(s)
RCS	Remote Command Station	The secondary Fire Command Location(s)
TSC	Terminal Strip Cabinet - Distribution Circuits	The Distribution / Interface cabinet for SPK & STR Circuits
TIB	Terminal Strip Cabinet - Distribution / Addressable Circuits	The connection point for signalling and addressable circuits. (Used in the concourse only)
ATC	ALD Terminal Cabinet	The Distribution / Interface cabinet for ALD Circuits
ALD	Analog Loop Driver	The Addressable Data circuit(s) which all smoke detectors and other initiating devices are connected to.
SPK	Notification Appliance Circuit - Speaker	The audible occupant signalling, made up of distributed engineered speaker coverage in all areas.
STR	Notification Appliance Circuit - Strobe	The visual occupant signalling, made up of distributed engineered strobe coverage in all areas.

Backbone System Architecture

This page describes the WTC Base Building Fire Alarm System Backbone or "Platform". This represents the core system consisting of selected control, wiring and interface hardware. All Base Building Detection, Notification and Control is handled by and through this system.

There are (6) individual systems protecting the WTC Complex. Each is a Siemens/Cerberus Division MXLV Integrated Fire/Evac System. The (6) Systems protect the following buildings and areas: 1 WTC (NT-North Tower), 2 WTC (ST-South Tower), 4WTC (SE-Southeast Plaza Building), 5WTC (NE-Northeast Plaza Building), Concourse/Mall (CS-Concourse), and the Parking, Storage and Utility Spaces found below grade level (SG-Subgrade).

Distributed throughout the complex are various transponders, terminal cabinets and interface points which provide access to the BBFAS platform.
Figure 2 below is for reference only, representative of a selected cross section of the BBFAS. Detailed information related to connections can be found within this guidelines manual.

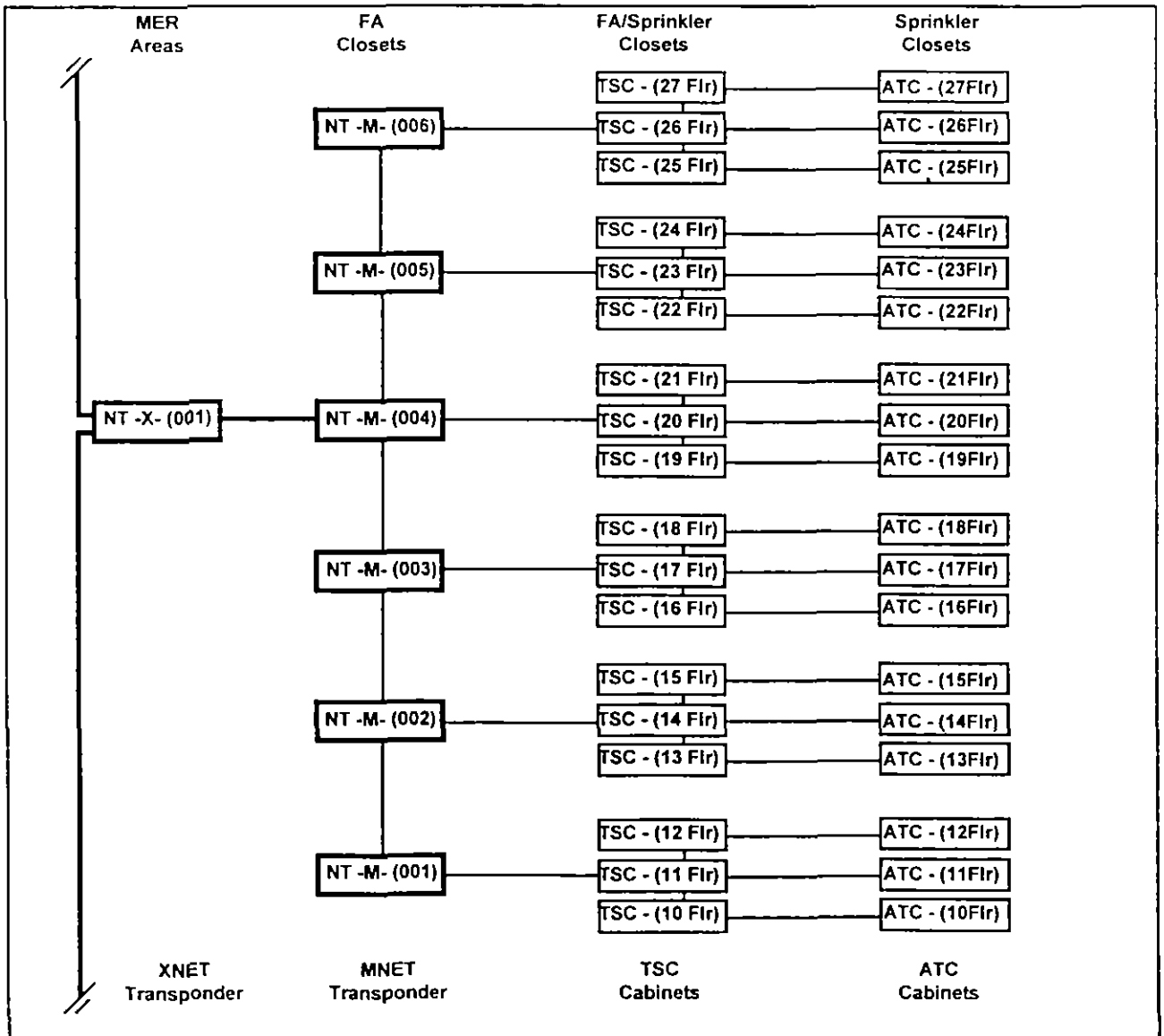


FIGURE 2 - TYPICAL BBFAS FIRE ALARM BACKBONE RISER AND DISTRIBUTION DIAGRAM

TSC & ATC Distribution Cabinets

This Page describes what, how and where TCS & ATC cabinets are used to provide ALD, Speaker & Strobe circuits to each floor.

Each Tenant Floor is provided with one TSC cabinet & one ATC cabinet.

The TSC Cabinet can be found in the Core Fire Alarm Closet (FC) on Transponder equipped floors or in the Fire Sprinkler Closet (CS) on all others. Each TSC is equipped to provide:

(4) class B Speaker Circuits and (6) Class B Strobe Circuits.

The ATC Cabinet can be found in the Core Fire Sprinkler Closet (SC).
Each ATC is equipped to provide (1) Class B ALD Addressable Device loop divided into (5) Use Specific Branch circuits as follows:

ELEV Branch: Elevator Lobby Smoke Detectors - Passenger & Freight
AREA Branch: Open Area Smoke Detectors - Phone, Elect, & FA Closets
HVAC Branch: Ventilation Smoke Detectors - Plenums & Ducts
TEN1 Branch: Tenant Subsystem Interface 1 - TRI Monitoring
TEN2 Branch: Tenant Subsystem Interface 2 - TRI Monitoring

Both the TSC & ATC are Pre-Installed & Configured as part of the BBFAS.

The Engineer is responsible to verify field conditions as to the availability and capacity of circuits.

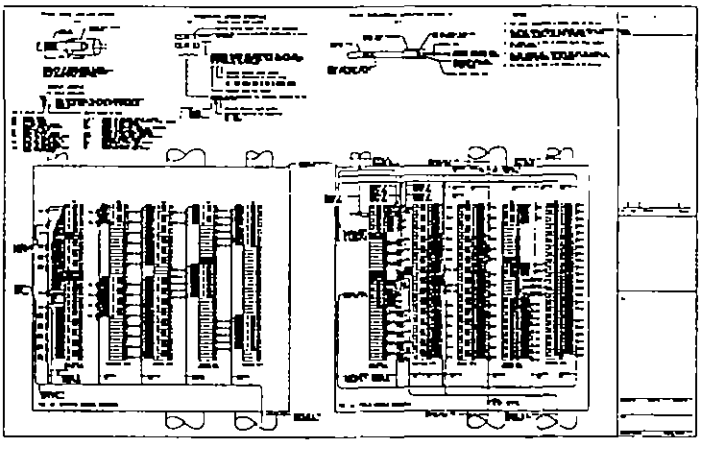


FIGURE 3
Typical TSC Cabinet

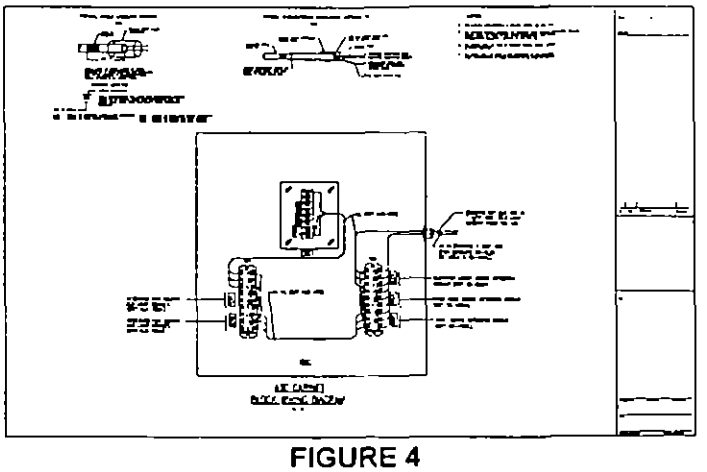


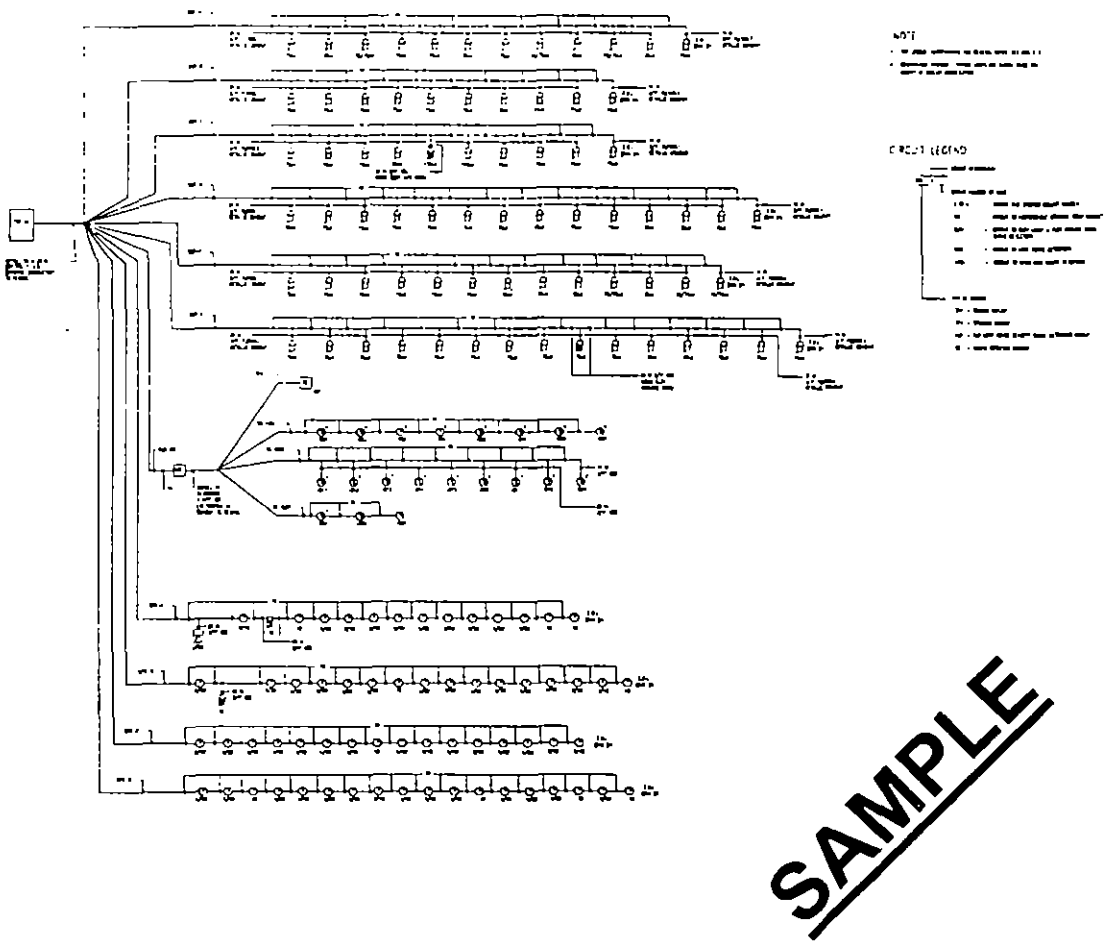
FIGURE 4
Typical ATC Cabinet

System Design - Riser & One Line Drawings

This Page describes how the Riser/One Line Drawing is incorporated into the Design and Drawing Package.

The Riser/One Line Drawing is required. The drawing must show in diagrammatic format each cabinet, circuit, raceway, notification appliance type with respective audio power in watts and intensity power in candela, detection device type with respective address and mounting location, and any other information which may be needed to cross check the plans.

The sample reference drawing shown can be found in B Size (11 x 17) in the rear of this manual



REFERENCE DRAWING 1.0
Typical Floor Riser / One Line Drawings

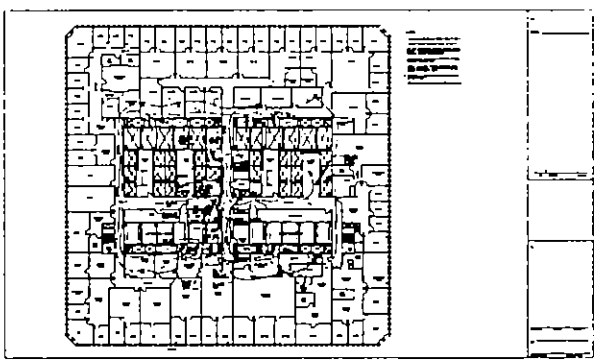
System Design - Fire Detection & Interface Devices

All Base Building Fire Detection Devices and Interface Devices are wired into the respective ALD circuit provided from the ATC Cabinet located in the Fire Sprinkler Closet (SC) found on each floor.

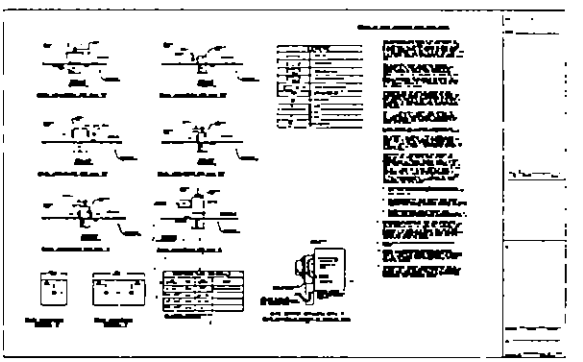
ALD circuits must be 14 AWG. Shielded Twisted Pair 150C Teflon Cable Assemblies. Wiring is run in a "Daisy Chain" fashion. T-Taps are not permitted. (55) Device addresses are preallocated for each floor. Device addresses are provided & coordinated by the Port Authority. All Devices must be selected from and used in accordance with the approved equipment list (Page- 14).

BBFAS Fire Detection Devices (FP-11 Smoke Detectors) must be installed in each Elevator Lobby, Electrical, Telephone and Fire Alarm Transponder Closet, and HVAC Air Returns. BBFAS Interface Devices (TRI-B6D) must be installed to monitor each tenant owned subsystem installed. Tenant FA (Fire Alarm) Subsystems must be monitored for a General Alarm Condition per Floor Served, and a General Trouble for each Subsystem Panel. Tenant PA (Preaction) Subsystems must be monitored for a Smoke Detection Alarm Condition per Floor Served, a Waterflow Alarm Condition for each Floor Served, a General Trouble and Supervisory Condition for each Subsystem Panel. All input contacts from the Tenant Subsystem to the TRI must be Dedicated Normally Open Type with No Voltage Present.

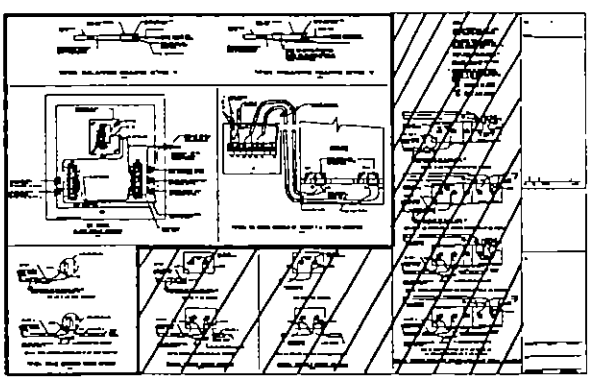
The sample reference drawings shown can be found in B Size (11 x 17) in the rear of this manual



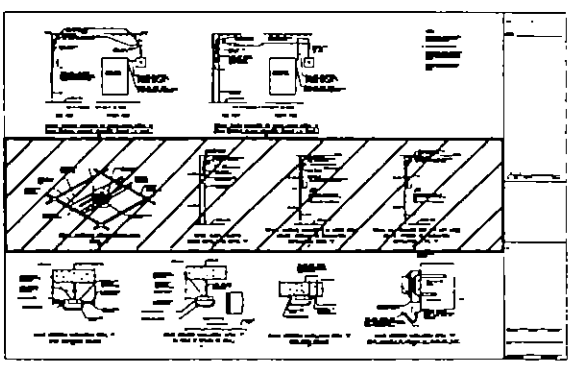
REFERENCE DRAWING 2.0
Typical Device Design Layout



REFERENCE DRAWING 3.0
Typical Device Installation Details
Return Air Location



REFERENCE DRAWING 4.0
Typical Device Wiring Details



REFERENCE DRAWING 5.0
Typical Device Installation Details
Open Air Location

System Design - Visual Appliances - Strobes

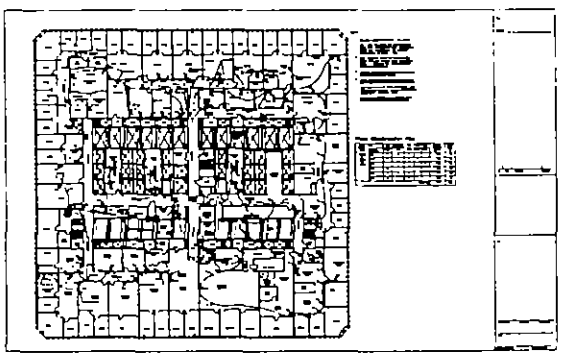
All Base Building Visual Notification Appliances (Strobes) are wired into the respective STR circuit provided from the TSC Cabinet located in the Fire Alarm (FC) or Sprinkler Closet (SC) found on each floor.

STR circuits must be minimum 14 AWG. Shielded Twisted Pair 150C Teflon Cable Assemblies. Wiring is run in a "Daisy Chain" fashion in compliance with the building routing standard for STR Circuits. T-Taps are not permitted. (6) Circuits are provided for each floor. Each circuit is rated for a maximum load of 1.5 Amps @ 24VDC and a Maximum Combined Load of 7.2 Amps for all (6) Circuits. Wiring must be sized to minimize voltage drop. Circuit Resistance must not exceed 3.0 Ohms per Circuit. These values must not be exceeded, exceptions will not be allowed. Balancing is not required. All Appliances must be selected from and used in accordance with the approved equipment list (Page- 14).
The Engineer is responsible to field survey existing conditions & circuit use.

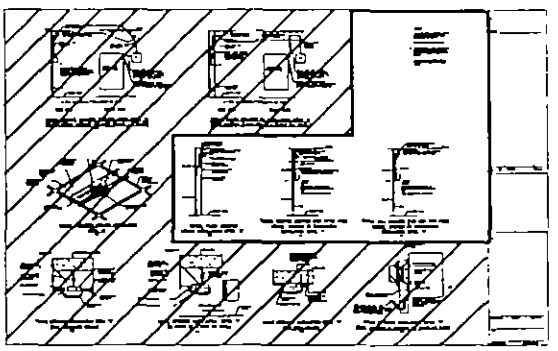
BBFAS Visual Notification Appliances (Strobes) must be installed in compliance with Applicable Codes and Standards. The Engineer is solely responsibility to determine, design and verify the requirements of visual notification appliance use, placement, intensity, etc. This document is not intended to provide guidance regarding visual performance requirements.

The Engineer shall provide a Strobe Circuit/Loading Table on Each Drawing.

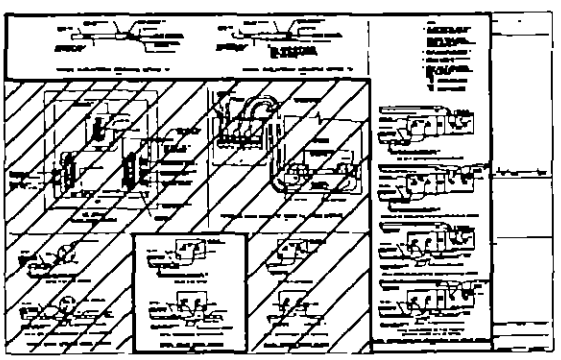
The sample reference drawings shown can be found in B Size (11 x 17) in the rear of this manual



REFERENCE DRAWING 7.0
Typical Strobe Design Layout



REFERENCE DRAWING 5.0
Typical Strobe Installation Details



REFERENCE DRAWING 4.0
Typical Strobe Wiring Details

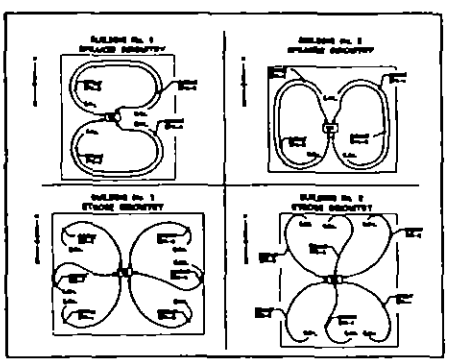


FIGURE 5
Typical Circuit Routing Detail

System Design - Audible Appliances - Speakers

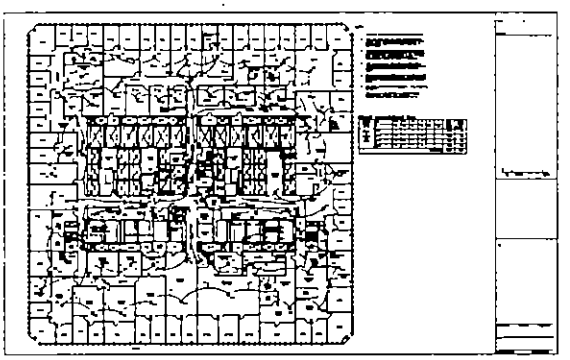
All Base Building Audible Notification Appliances (Speakers) are wired into the respective SPK circuit provided from the TSC Cabinet located in the Fire Alarm (FC) or Sprinkler Closet (SC) found on each floor.

SPK circuits must be minimum 14 AWG. Unshielded Twisted Pair 150C Teflon Cable Assemblies. Wiring is run in a "Daisy Chain" fashion in compliance with the building routing standard for SPK Circuits. T-Taps are not permitted. (4) Circuits are provided for each floor. Each circuit is rated for a maximum load of 25 Watts @ 70.7 VRMS and a Maximum Combined Load of 25 Watts for all (4) Circuits. Wiring must be sized to minimize voltage drop. Circuit Impedance must not exceed 6.5 Ohms per Circuit. These values must not be exceeded, exceptions will not be allowed. Balancing is not required. All Appliances must be selected from and used in accordance with the approved equipment list (Page- 14).
The Engineer is responsible to field survey existing conditions & circuit use.

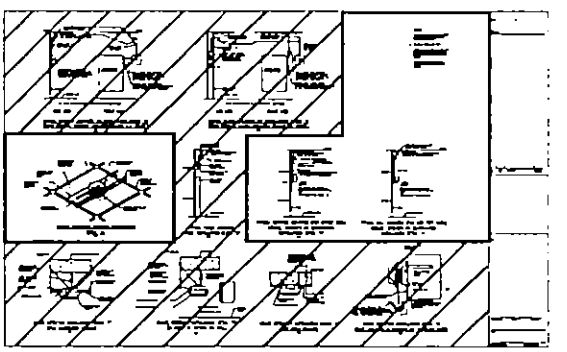
BBFAS Audible Notification Appliances (Speakers) must be installed in compliance with Applicable Codes and Standards. The Engineer is solely responsibility to determine, design and verify the requirements of Audible notification appliance use, placement, audibility, etc. This document is not intended to provide guidance regarding Audible performance requirements.

The Engineer shall provide a Speaker Circuit/Loading Table on Each Drawing.

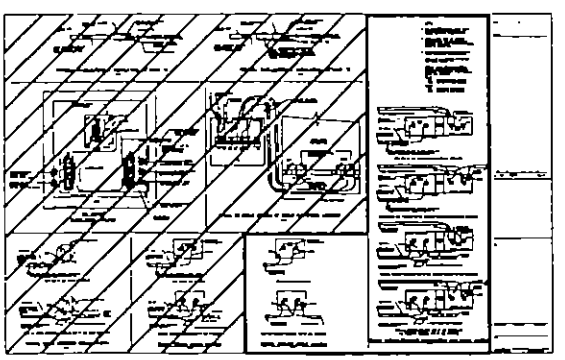
The sample reference drawings shown can be found in B Size (11 x 17) in the rear of this manual



REFERENCE DRAWING 8.0
Typical Speaker Design Layout



REFERENCE DRAWING 5.0
Typical Installation Details



REFERENCE DRAWING 4.0
Typical Speaker Wiring Details

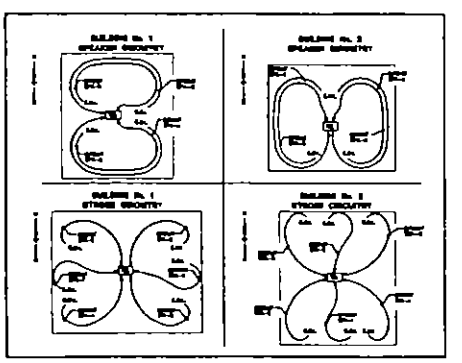


FIGURE 5
Typical Circuit Routing Detail

System Design - Circuit Performance Criteria Summary

Initiating Device Circuits - Addressable - ALD - (Page 6)

Nominal Circuit Voltage	20 VDC - Operating
Max Circuit Impedence	100 Ohm TSC to Last Device
Max Circuit Capacitance	.05 Mfd / Red to Black - TSC to Last Device on Circuit
Min Circuit Insulation Resistance	2 M Ohms / Red to Black, Red to Ground, Black to Ground Red to Shield, Black to Shield, Shield to Ground
Max Circuit Load	55 Addresses
Max Total Load Floor	55 Addresses
Wiring	Min. 14/2 Shielded Twisted Pair 200C Teflon
Wiring	Max. 12/2 Shielded Twisted Pair 200C Teflon
Max. Circuits per Floor	(1) - All Devices
Configuration	Breakout branch circuit taps at ATC Cabinet
Configuration	(1) (HVAC) - HVAC Detector Ckt (1) (Area) - Telephone, Electric and Fire Alarm Transponder Closet Detector Ckt (1) (ELV) - Elevator Lobby Detector Ckt (1) (TEN1) - Tenant Subpanel TRI Interface Ckt
System Connection Point	(1) (TEN2) - Tenant Subpanel TRI Interface Ckt ATC Cabinet - Center Corridor - SC Closet

Notification Appliance Circuits - Strobes - (Page 7)

Nominal Circuit Voltage	24 VDC - Operating
Max Circuit Resistance	3.0 Ohm TSC to Last Appliance on Circit
Max Circuit Capacitance	.05 Mfd / Red to Black - TSC to Last Appliance on Circuit
Min Circuit Insulation Resistance	2 M Ohms / Red to Black, Red to Ground, Black to Ground Red to Shield, Black to Shield, Shield to Ground
Max Circuit Load	1.5 Amps - Sum of All Strobe load on Circuit
Max Total Load Floor	7.2 Amps - Sum of All Strobes load on ALL (6) circuits
Wiring	Min. 14/2 Shielded Twisted Pair 200C Teflon
Wiring	Max. 12/2 Shielded Twisted Pair 200C Teflon
Max. Circuits per Floor	(6) - Tenant & Common Spaces
Configuration	Circuits (A,B,C,D,E,F) - Tenant & Common Spaces.
System Connection Point	TSC Terminal Cabinet - Center Corridor - FC or SC Closet

Notification Appliance Circuits - Speakers - (Page 8)

Nominal Circuit Voltage	70.7VRMS - Operating
Max Circuit Impedence	6.5 Ohm TSC to Last Appliance on Circuit
Max Circuit Capacitance	.05 Mfd / Red to Black - TSC to Last Appliance on Circuit
Min Circuit Insulation Resistance	2 M Ohms / Red to Black, Red to Ground, Black to Ground
Max Circuit Load	25 Watts - Sum of All Speaker Tap setting on Circuit
Max Total Load Floor	25 Watts - Sum of All Speaker Tap setting on ALL (4) circuits
Wiring	Min. 14/2 Unshielded Twisted Pair 200C Teflon
Wiring	Max. 12/2 Unshielded Twisted Pair 200C Teflon
Wiring	Daisy Chain Configuration - A/B Counter rotation - Routing Standard
Max. Circuits per Floor	(4) - Tenant & Common Spaces
Configuration	Circuits (A,B,C,D) - Tenant & Common Spaces.
System Connection Point	TSC Terminal Cabinet - Center Corridor - FC or SC Closet

System Design - Wiring - Acceptance Test - Wiring

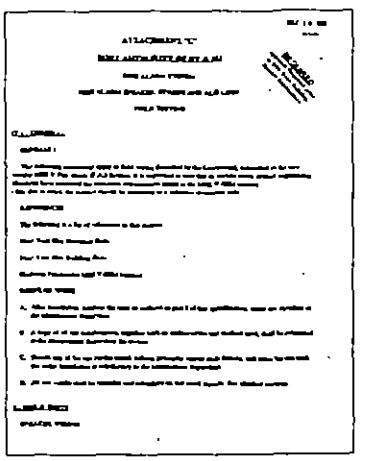
This page describes the procedures that must be followed and the documentation that is required of all BBFAS wiring after rough in and preparation but prior to device & appliance installation and building tie-in.

All wiring must be thoroughly tested in accordance with the field wiring test procedure commonly referred to as "PA Attachment C". This procedural document outlines in detail all of the information required to conduct field testing of ALD, SPK & STR circuit wiring. The required forms are also included.

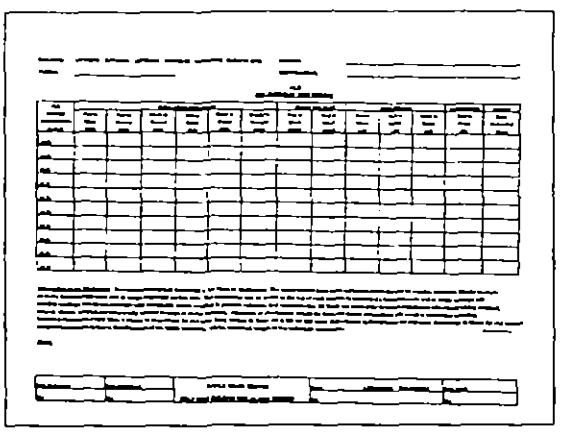
Upon completion and submittal the test results are reviewed and either approved or rejected. No connection of field wiring will be made to the BBFAS until such time as an approved copy of the test results is on file.

Final Tie-In of Field Wiring to the BBFAS is the exclusive domain of the Port Authority.

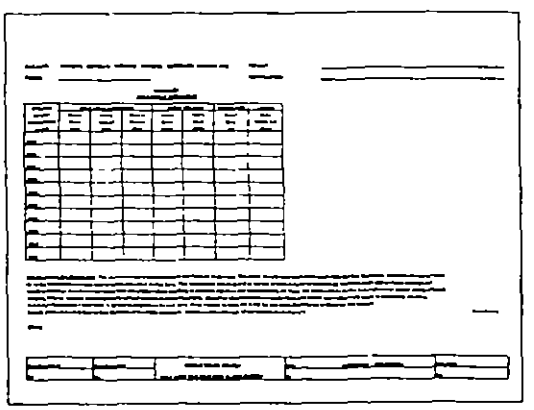
Listed below are sample resources in the form of sketches, drawing, list and details required for this work. They can be found in the back of this manual in A Size (8.5 x 11) format.



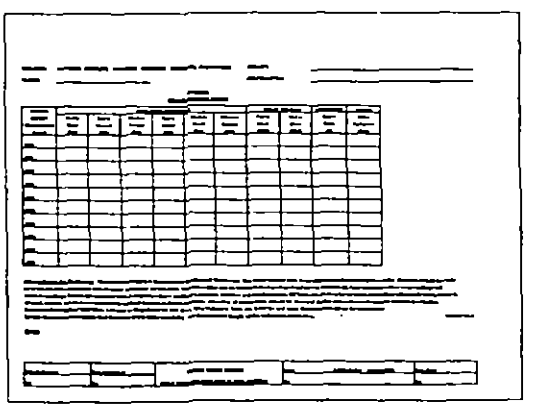
REFERENCE DOCUMENT 1
WTC "ATTACHMENT C"



REFERENCE DOCUMENT 2
WTC Wire Test From
ALD Circuits



REFERENCE DOCUMENT 3
PA WTC Wire Test Form
Speaker Circuits



REFERENCE DOCUMENT 4
WTC Wire Test Form
Strobe Circuits

System Design - Contractor TIE-IN & PRETEST Checklist

This page describes the Contractor Tie-In & Pretest Checklist. This Document is Required and must be submitted prior to the Connection/Tie-In and Pre Testing of Devices, Appliances and Interfaces requiring connection to the BBFAS.

Prior to and in compliance with the advance notification requirements(24 Hours) the Contractor Tie-In & Pre-Test Checklist must be submitted.Each Item listed on the checklist must be completed in its entirety, partial submissions or incomplete submissions will not be accepted. The checklist has been found to be an important tool that the contractor can use to assure that all work has been completed prior to requesting BBFAS Connection/Tie-In and Pretesting.

The Contractor Tie-In & Pretest Checklist is provided in this manual.

The Port Authority of NY & NJ	WTC BASE BUILDING FIRE ALARM SYSTEM CONTRACTOR TIE-IN & PRE-TEST CHECKLIST	Electrical Operations and Maintenance

This checklist is designed to assist the contractor, to reduce construction delays, [illegible] tenant [illegible] increase productivity and reduce delivered costs. The items listed are required to be completed prior to the scheduling of the WTC Base Building Fire Alarm System Tie-in and Pre-Testing.

Please direct completed forms, scheduling and technical requests to Mr Ray [illegible], at 212-435-[illegible]

>>>>> 24 Hour Advance Notice Required Prior to Tie-in and Pre Testing Scheduling <<<<<

1 TENANT Name ______________________ (PRINT)

2 BLDG Location 1WTC 2WTC 4WTC 5WTC CONCOURSE SUBGRADE (CIRCLE)

3 BLDG Floor ______________________ (PRINT)

4 CONTRACTOR Name ______________________ (PRINT)

5 Wire Test Results - Submitted Corrected as Required and Approved [ ] Completed [ ] Not Applicable

6 Speaker/Strobe Wiring in TEC ALD Wiring in ATC Ready for Tie-In [ ] Completed [ ] Not Applicable

7 Speakers set at selected power levels and installed *(Power setting in Watts, per Design)* [ ] Completed [ ] Not Applicable

8 Strobes match selected power levels and installed *(Power setting in Candela, per Design)* [ ] Completed [ ] Not Applicable

9 Smoke Detectors programmed, labeled and installed. [ ] Completed [ ] Not Applicable

10 TRI Interfaces programmed, labeled and installed. [ ] Completed [ ] Not Applicable

11 Waterflow and Tamper Devices Installed and Operational [ ] Completed [ ] Not Applicable

12 Tenant SubSystem(s) installed and Operational. [ ] Completed [ ] Not Applicable

13 Fire Alarm Drawings - As Installed including all Changes *(2 Sets - Submitted in Advance to PA O&M Electrical Supervisor)* [ ] Completed [ ] Not Applicable

14 Architect, Engineer, and General Contractor [illegible] with Status [ ] Completed [ ] Not Applicable

15 I certify that the WTC Base Building Fire Alarm Work required for the referenced Tenant Project has been completed in its entirety compliant with the Plans and Specifications submitted and Released, and I am ready for the System Pretest.

FAX COMPLETED FORM TO:
Mr Ray [illegible]
WTC O&M - Electrical
1-212-435-[illegible]

16 Signed ______________________

17 Date ______________________

[illegible]

REFERENCE DOCUMENT 5
CONTRACTOR TIE-IN & PRETEST CHECKLIST

System Design - Acceptance Tests - Devices, Appliances & Interface

This page describes the procedures that must be followed and the documentation that is required of all BBFAS Devices, Appliances & Interfaces after Tie-In to the BBFAS prior to the Final Inspection.

All Devices, Appliances and Interfaces must be 100% tested including but not limited to Function Testing of Elevator Recall, Fan Shutdown, etc. Final Inspection and Occupancy will not be permitted until all Acceptance Testing has been completed and approved by the Port Authority. The Engineer must allow for these tests and any retesting required as part of this project. All BBFAS test reports and the actual acceptance tests will be conducted by the Port Authority and it's BBFAS Contractor. It is highly recommended that the Engineer & Contractor be present during these tests.

The Test Report reference documents furnished below are provided to familiarize the Engineer with the substance of a Typical Test Report. These documents are not intended for incorporation into the design documents.

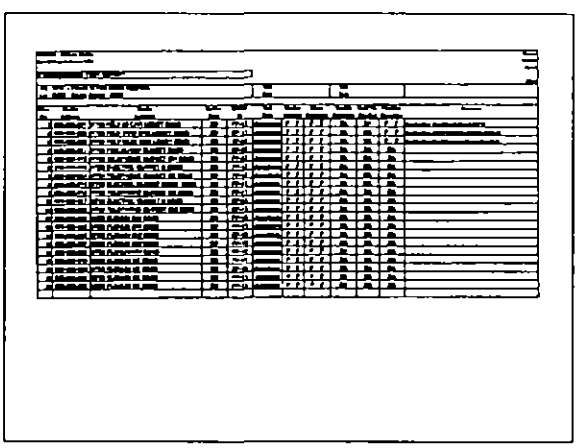


FIGURE 6
Typical ALD Device Test Report

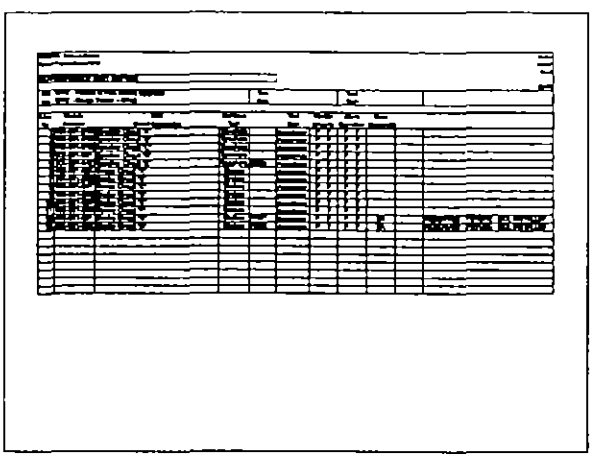


FIGURE 7
Typical NAC Appliance Test Report

System Design - Summary

This Page is the Summary of the preceeding 12 pages contained in this Guidelines Manual.

The manual has been organized in a step be step manner from System Introduction, through the Design process and ending with Acceptance Testing. Furthermore, the manual is not intended to replace the design skills required of a qualified Professional Engineer to produce an Engineered Fire Alarm System but instead familiarize the Engineer with the requirements and features of the World Trade Center BBFAS.

Listed below are the steps, in order, involved with the design, installation, testing and acceptance process.

Item	Description
1)	Design TAA/Tenant Floor Devices, Appliances and Interfaces.
2)	Design Submission and Review by Port Authority.
3)	Comments and Revisions
4)	Final Drawing Approval.
5)	Construction Approval
6)	Installation of Rough Wiring.
7)	Acceptance Testing of Rough Wiring.
8)	Installation of Devices, Appliances and Interfaces.
9)	Completion and Submission of Contractor Tie-In/Pretest Documents
10)	Tie-In of Devices, Appliances and Interfaces.
11)	Pre-Test of Devices, Appliances and Interfaces.
12)	Ready for Final/Controlled Inspection.
13)	Issue As-Built Record Drawings.
14)	Project Close Out.

Notes on the Use of Reference Materials provided in this Manual.

FIGURES-	FOR INFORMATION ONLY for purposes of Illustration.
DOCUMENTS-	REQUIRED as part of the TAA Construction Package.
DRAWINGS-	REQUIRED as part of the TAA Design Package.

Cerberus Pyrotronics
Special Projects Group
World Trade Center
Base Bldg Fire Alarm System
Equipment Schedule

PA Attachment "A"

Sheet 1

Notification Appliances

J. Drucker - CPY
Last Rev: 11/24/98
Rev. 2 - Desc. Correction- ET70

Model #	Part #	Description	Special Modifications/Comments	Color	Usage	
E-70R	Wheelock	70.7 V - 1/8-2W Speaker-Sqaure-Wall	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)	Red	PA Specified	
ET70-R	Wheelock	70.7 V - 1/8-8W Speaker-Square-Wall	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)	Red	PA Specified	
E90-W	Wheelock	70.7 V - 1/8-2W Speaker-Round-Ceiling	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)	White	PA Specified	
ET90-W	Wheelock	70.7 V - 1/8-8W Speaker-Round-Ceiling	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)	White	PA Specified	
RSS-2415W-FR	Wheelock	24VDC - Non Sync & Sync - 15 cd Strobe -Wall	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)	Red	PA Specified	
RSS-241575W-FR	Wheelock	24VDC - Non Sync & Sync - 15/75 cd Strobe -Wall	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)	Red	PA Specified	
RSS-2430W-FR	Wheelock	24VDC - Non Sync & Sync - 30 cd Strobe -Wall	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)	Red	PA Specified	
RSS-2475W-FR	Wheelock	24VDC - Non Sync & Sync - 75 cd Strobe -Wall	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)	Red	PA Specified	
RSS-24110W-FR	Wheelock	24VDC - Non Sync & Sync - 110 cd Strobe -Wall	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)	Red	PA Specified	
E70-2415W-FR	Wheelock	70.7 V - 1/8-2W Speaker / 24VDC - Non Sync & Sync - 15 cd Strobe - Wall (3)	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)	Red	PA Specified	
E70-241575W-FR	Wheelock	70.7 V - 1/8-2W Speaker / 24VDC - Non Sync & Sync - 15/75 cd Strobe - Wall (3)	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)	Red	PA Specified	
E70-2430W-FR	Wheelock	70.7 V - 1/8-2W Speaker / 24VDC - Non Sync & Sync - 30 cd Strobe - Wall (3)	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)	Red	PA Specified	
E70-2475W-FR	Wheelock	70.7 V - 1/8-2W Speaker / 24VDC - Non Sync & Sync - 75 cd Strobe - Wall (3)	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)	Red	PA Specified	
E70-24110W-FR	Wheelock	70.7 V - 1/8-2W Speaker / 24VDC - Non Sync & Sync - 110 cd Strobe - Wall (3)	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)	Red	PA Specified	
ET70-2415W-FR	Wheelock	70.7 V - 1/8-8W Speaker / 24VDC - Non Sync & Sync - 15 cd Strobe - Wall (3)	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)	Red	PA Specified	
ET70-241575W-FR	Wheelock	70.7 V - 1/8-8W Speaker / 24VDC - Non Sync & Sync - 15/75 cd Strobe - Wall (3)	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)	Red	PA Specified	
ET70-2430W-FR	Wheelock	70.7 V - 1/8-8W Speaker / 24VDC - Non Sync & Sync - 30 cd Strobe - Wall (3)	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)	Red	PA Specified	
ET70-2475W-FR	Wheelock	70.7 V - 1/8-8W Speaker / 24VDC - Non Sync & Sync - 75 cd Strobe - Wall (3)	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)	Red	PA Specified	
RSSP-24110W-FR	Wheelock	24VDC - Non Sync & Sync - 110 cd Strobe - Retro Plate - Wall (3)	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)	Red	PA Specified	
		use w/ E70-R or ET70-R Speakers				
BB	Wheelock	Backbox	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)		PA Specified	
DBB	Wheelock	Backbox	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)		PA Specified	
SBB	Wheelock	Backbox	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)		PA Specified	
SHBB	Wheelock	Backbox	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)		PA Specified	
SBL-2	Wheelock	Backbox	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)		PA Specified	
WBB	Wheelock	Backbox - Weather Resistant	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)		PA Specified	
ISP	Wheelock	Surface Adapter	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)		PA Specified	
RP-R	Wheelock	Retrofit Adapter	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)		PA Specified	
SSB-4	Wheelock	Ceiling Support Bridge	CPY/UL Compatibility Accepted - WTC BBFAS Only (1,2)		PA Specified	

Cerberus Pyrotronics
Special Projects Group
World Trade Center
Base Bldg Fire Alarm System
Equipment Schedule

Attachment "A"

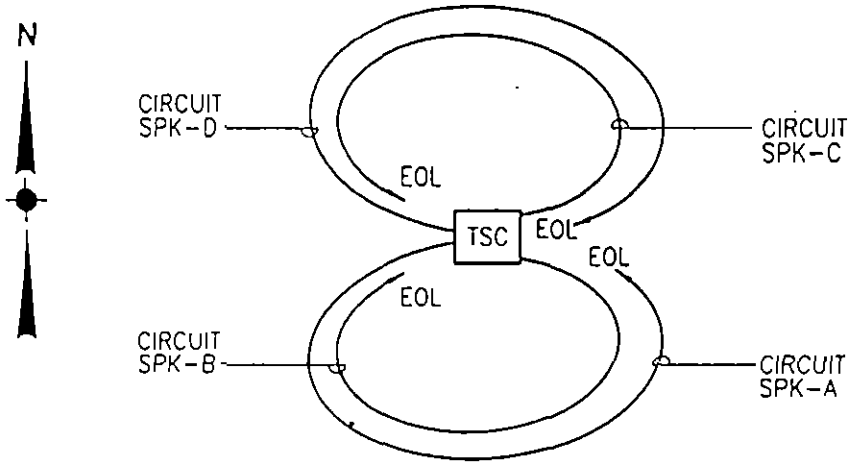
Sheet 2

Initiating Devices

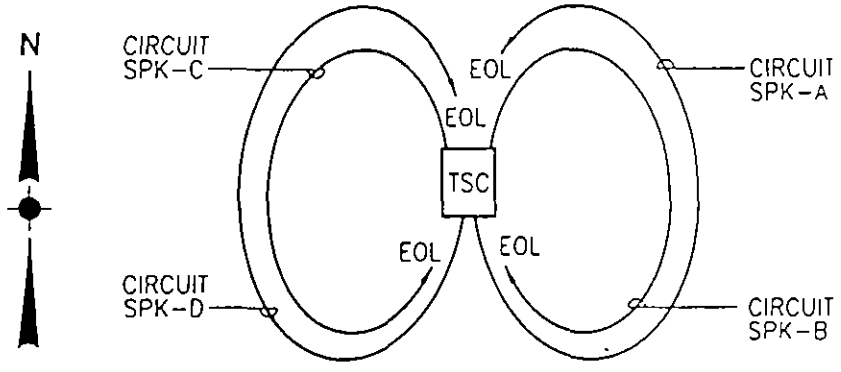
J. Drucker - CPY
Last Rev: 7/21/98
Rev. 1

Model #	Part #	Description		Special Modifications/Comments	Color	Usage
ILI-1	500-092725	Open Area Smoke Detector - Ionization -	0-300 Fpm	For Open Area Use Only - Spot Applications	White	Designs Prior to Jan 1 98
ILI-1A	500-093023	Open Area Smoke Detector - Ionization - High Velocity	0-1200 Fpm	For Open Area Use Only - Spot Applications	White	Designs Prior to Jan 1 98
ILI-1B	500-093026	Duct Smoke Detector Only - Ionization - High Velocity	500-4000 Fpm	For Use w/ AD-3I Duct Housing Only	White	Designs Prior to Jan 1 98
DB-3S	595-381804	Open Area Detector Mounting Base		For Use w/ ILI-1 & ILI-1A Smoke Detectors	White	Designs Prior to Jan 1 98
AD-3I	500-086495	Duct Housing for ILI-1B Smoke Detector		For Use w/ ILI-1B Smoke Detector Only	Black	Designs Prior to Jan 1 98
ILP-2	500-095026	Open Area Smoke Detector - Photo - FirePrint		Application Specific Detection	White	EMR/MGR Areas
DB-3S	595-381804	Open Area Detector Mounting Base		For Use w/ ILP-2 Smoke Detectors	White	EMR/MGR Areas
FP-11	500-095112	Open Area Smoke Detector - Photo/Thermal - FirePrint		Application Specific Detection	White	All Other Applications
DB-11	500-094151	Open Area Detector Mounting Base		For Use w/ FP-11 Smoke Detector Only	White	All Other Applications
AD-11P	500-095656	Duct Housing for FP-11 Smoke Detector		For Use w/ FP-11 Smoke Detector Only	Black	All Other Applications
STA-2	500-684360	Sampling Tube - One required for each Duct Housing		9" - 1'9" Width Ducts	Metallic	All Duct SD Apps
STA-3	500-684361	Sampling Tube - One required for each Duct Housing		1'-9" - 3'3" Duct Widths	Metallic	All Duct SD Apps
STA-6	500-684362	Sampling Tube - One required for each Duct Housing		3'-3" - 6'-3" Duct Widths	Metallic	All Duct SD Apps
STA-10	500-684363	Sampling Tube - One required for each Duct Housing		6'-3" - 9'9" Duct Widths	Metallic	All Duct SD Apps
TRI-B6	500-891870	Single Dry Contact Input Only	(1) Address	3 1/2" Double Gang Deep Box Mtg.	Metallic	All
TRI-B6D	500-891871	Dual Dry Contact Input Only	(2) Address	3 1/2" Double Gang Deep Box Mtg.	Metallic	All
TRI-60R	500-891872	Single Dry Contact Input w/ 1Amp (L)/ 2 Amp (R) Form C Relay	(1) Address	3 1/2" Double Gang Deep Box Mtg.	Metallic	All
MSI-CS2	————	Pull Station - Metal - Single Action - White Strip	(PA Supplied)	Special Order	Red	BBFAS Use Only
MS-DA	————	Double Action Adapter for MSI-CS2 Pull Station	(PA Supplied)	Special Order	Black	BBFAS Use Only

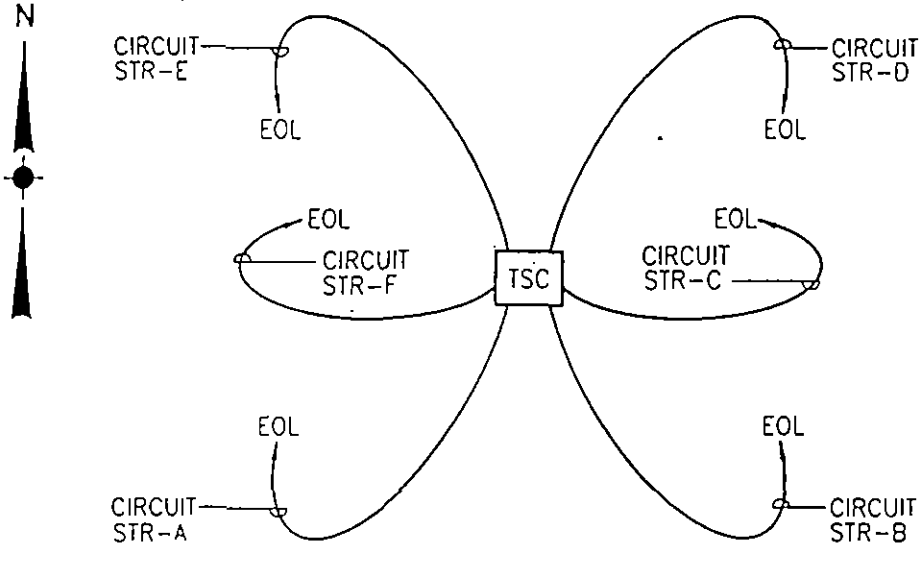
NORTH TOWER (NT) - 1 WTC
SPEAKER CIRCUITING



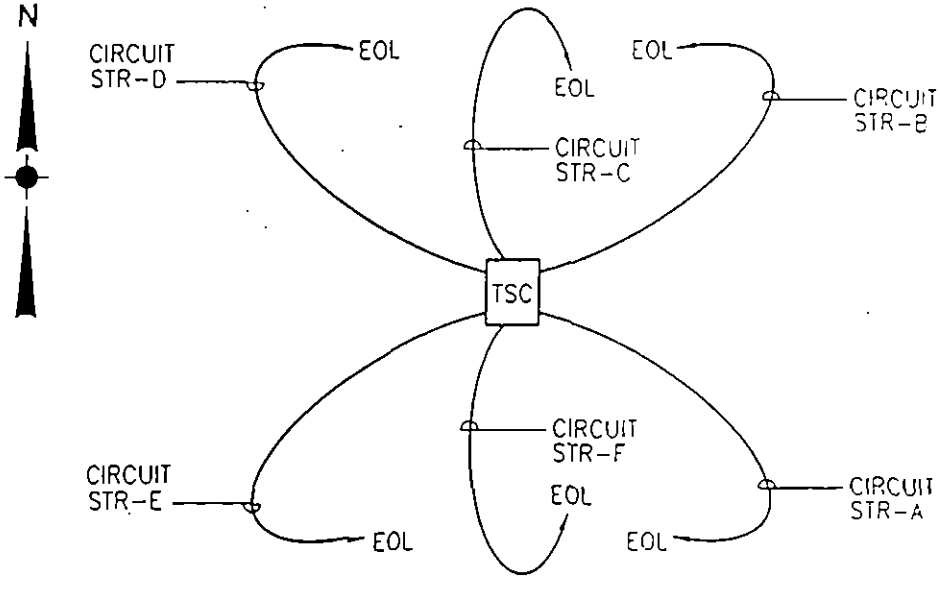
SOUTH TOWER (ST) - 2 WTC
SPEAKER CIRCUITING



NORTH TOWER (NT) - 1 WTC
STROBE CIRCUITING



SOUTH TOWER (ST) - 2 WTC
STROBE CIRCUITING



SIEMENS - Cerberus Division
Special Projects Group / WTC

Drucker
10/29/97
Rev. 0

36222

STANDARDIZED TEST REPORT

Job WTC - Fire Alarm Upgrade
Loc WTC - North Tower NT63

Test Date Fri. Feb.19,1999

Test Tech CP-12/CP-19

Line No.	Device Address	Device Location	Device Type	Device ID	Test Type	Monitor Integrity	Alarm Operation	Trouble Operation	Duct Vel. Reading	Function Operation	Comments
1	005-062-007	NT63 FELV 50 CAR LOBBY BBSD	SD	FP-11	Acceptance	P F	P F	NA	NA	P F	Function Test- Recall Freight Elevator Car 50
2	005-062-008	NT63 FELV 17/49 CAR LOBBY BBSD	SD	FP-11	Acceptance	P F	P F	NA	NA	P F	Function Test- Recall Freight Elevator Cars 17 and 49
3	005-062-009	NT63 PELV 63-68 CAR LOBBY BBSD	SD	FP-11	Acceptance	P F	P F	NA	NA	P F	Function Test- Recall Passenger Elevator Cars 63-68
4	005-062-011	NT63 FIRE ALARM CLOSET BBSD	SD	FP-11	Acceptance	P F	P F	NA	NA	NA	
5	005-062-012	NT63 TELEPHONE CLOSET SW BBSD	SD	FP-11	Acceptance	P F	P F	NA	NA	NA	
6	005-062-013	NT63 ELECTRIC CLOSET S BBSD	SD	FP-11	Acceptance	P F	P F	NA	NA	NA	
7	005-062-014	NT63 TELEPHONE CLOSET SE BBSD	SD	FP-11	Acceptance	P F	P F	NA	NA	NA	
8	005-062-015	NT63 ELECTRIC CLOSET CORE BBSD	SD	FP-11	Acceptance	P F	P F	NA	NA	NA	
9	005-062-016	NT63 TELEPHONE CLOSET NE BBSD	SD	FP-11	Acceptance	P F	P F	NA	NA	NA	
10	005-062-017	NT63 ELECTRIC CLOSET N BBSD	SD	FP-11	Acceptance	P F	P F	NA	NA	NA	
11	005-062-018	NT63 TELEPHONE CLOSET NW BBSD	SD	FP-11	Acceptance	P F	P F	NA	NA	NA	
12	005-062-044	NT63 PLENUM SW BBSD	SD	FP-11	Acceptance	P F	P F	NA	NA	NA	
13	005-062-045	NT63 PLENUM SW BBSD	SD	FP-11	Acceptance	P F	P F	NA	NA	NA	
14	005-062-046	NT63 PLENUM NW BBSD	SD	FP-11	Acceptance	P F	P F	NA	NA	NA	
15	005-062-047	NT63 PLENUM NW BBSD	SD	FP-11	Acceptance	P F	P F	NA	NA	NA	
16	005-062-048	NT63 PLENUM NW BBSD	SD	FP-11	Acceptance	P F	P F	NA	NA	NA	
17	005-062-049	NT63 PLENUM NE BBSD	SD	FP-11	Acceptance	P F	P F	NA	NA	NA	
18	005-062-050	NT63 PLENUM NE BBSD	SD	FP-11	Acceptance	P F	P F	NA	NA	NA	
19	005-062-051	NT63 PLENUM NE BBSD	SD	FP-11	Acceptance	P F	P F	NA	NA	NA	
20	005-062-052	NT63 PLENUM SE BBSD	SD	FP-11	Acceptance	P F	P F	NA	NA	NA	

FIGURE-6

SIEMENS - Cerberus Division
Special Projects Group / WTC

Drucker
10/29/97
Rev 0

36222

STANDARDIZED TEST REPORT

Job WTC - Fire Alarm Upgrade Loc WTC - North Tower - NT63	Test Date	Test Tech	

Line No.	Module Address	NAC Circuit Designation	Appliance Type		Test Type	Monitor Integrity	Alarm Operation	Alarm Current (A)		
1	005-051-014	Speaker Circuit "A"	Speakers		Acceptance	P F	P F			
2	005-051-015	Speaker Circuit "B"	Speakers		Acceptance	P F	P F			
3	005-051-016	Speaker Circuit "C"	Speakers		Acceptance	P F	P F			
4	005-051-041	Speaker Circuit "D"	Speakers		Acceptance	P F	P F			
5	005-051-042	Speaker Circuit "E"	Speakers	Stairs	Acceptance	P F	P F			
6	005-051-025	Strobe Circuit "A"	Strobes		Acceptance	P F	P F			
7	005-051-026	Strobe Circuit "B"	Strobes		Acceptance	P F	P F			
8	005-051-027	Strobe Circuit "C"	Strobes		Acceptance	P F	P F			
9	005-051-028	Strobe Circuit "D"	Strobes		Acceptance	P F	P F			
10	005-051-029	Strobe Circuit "E"	Strobes		Acceptance	P F	P F			
11	005-051-030	Strobe Circuit "F"	Strobes		Acceptance	P F	P F			
12	005-051-031	Strobe Circuit "G"	Strobes	PAD1	Acceptance	P F	P F	NA		RESERVED - FUTURE - EOL INSTALLED
13	005-051-032	Strobe Circuit "H"	Strobes	PAD2	Acceptance	P F	P F	NA		RESERVED - FUTURE - EOL INSTALLED

FIGURE-7

DEC 16 1998
09/18/95

ATTACHMENT "C"

PORT AUTHORITY OF NY & NJ

REQUIRED
Approval Required prior to WTC Base Building System Connection.

FIRE ALARM SYSTEM

FIRE ALARM SPEAKER, STROBE AND ALD LOOP

FIELD TESTING

PART 1 - GENERAL

1.01 SUMMARY

The following parameters apply to field wiring (installed by the Contractor), connected to the new Pyrotronics MXLV Fire Alarm (F.A.) System. It is important to note that in certain cases, project engineering specifications have exceeded the minimum requirements stated in the MXLV-IOM manual. With this fact in mind, the manual should be consulted as a reference document only.

1.02 REFERENCES

The following is a list of references in this section:

- New York City Electrical Code.

New York City Building Code.

Cerberus Pyrotronics MXLV-IOM Manual.

1.03 SCOPE OF WORK

A. After installation, perform the tests as outlined in part 2 of this specification, under the direction of the Maintenance Supervisor.

B. A copy of all test result reports, together with an outline of the test method used, shall be submitted to the Maintenance Supervisor for review.

C. Should any of the test results reveal defects, promptly correct such defects, and rerun the test until the entire installation is satisfactory to the Maintenance Supervisor.

D. All test results shall be recorded and submitted on test result reports. See attached samples.

Part 2 - FIELD TESTS

2.01 SPEAKER WIRING

A. GENERAL

1. Speaker Wiring Circuits.
   a. Speaker circuit "A" - 1 pair.
   b. Speaker circuit "B" - 1 pair.

B. SEQUENTIAL TEST PROCEDURES

1. Install all field wiring (including stripping of the cable jacket and conductor insulation), heat shrinking and labeling. No connections to be made.

2. Visually inspect cables for physical damage and proper connection, in accordance with the Contract Drawings.

3. "Ring out" all circuits to verify continuity, proper markings and location.

4. Splice through all open connections (except the homerun to TSC, and last device cable end), using a temporary "wire-nut" approved by the Engineer.

5. Perform insulation resistance and stray voltage tests.

6. Apply a short between the red and the black conductors at the last device cable end, using a temporary "wire-nut" approved by the Engineer and perform resistance test.

7. After all testing, remove temporary "wire-nuts" and connect speakers and end of line resistors (E.O.L.).

C. EXECUTION

1. General

   a. Wiring shall be checked and tested by the Contractor, in accordance with this procedure, to ensure that the system is free of shorts, open and ground faults.

   b. A copy of all test reports shall be submitted to the Maintenance Supervisor for approval .

2. Test performance

   a. Insulation resistance - Test all wires and cables installed under this contract (and as outlined below), with a 1000 Volt Megohmmeter (megger). Applied potential to be 1000 Volts DC for 1 minute.

      Red Conductor to Black Conductor: _____ MΩ.

      Red Conductor to Ground: _____ MΩ.

      Black Conductor to Ground: _____ MΩ.

b. Stray Voltage - Test all wires cables installed under this contract (and as outlined below), with the Fluke 87 Multimeter.

Red Conductor to Black Conductor: _____ AC Volts.

Red Conductor to Black Conductor: _____ DC Volts.

c. Resistance - Test all wires and cables installed under this contract (and as outline below), with the Fluke 87 Multimeter.

Red Conductor to Black Conductor: _____ Ohms.

d. A copy of all test results reports (see sample test results report), shall be submitted to the Maintenance Supervisor for approval.

e. After all test result reports have been approved by the Maintenance Supervisor, contractor shall remove temporary test connections and connect all wiring as shown on the Contract Drawings.

2.02 STROBE WIRING

A. SEQUENTIAL TEST PROCEDURES

1. Install all field wiring (including stripping of the cable jacket and conductor insulation), heat shrinking and labeling. No connections to be made.

2. Visually inspect cables for physical damage and proper connection, in accordance with the Contract Drawings.

3. "Ring-out" all circuits to verify continuity, proper markings and location.

4. Splice through all open connections (except the homerun to TSC, and last device cable end), using a temporary "wire-nut" approved by the Engineer.

5. Perform insulation resistance and stray voltage tests.

6. Apply a short between the red and the black conductors at the last device cable end, using a temporary "wire-nut" approved by the Engineer and perform resistance test.

7. After all testing, remove temporary "wire-nuts" and connect strobes and end of line resistors (E.O.L.).

B. EXECUTION

1. General

a. Wiring shall be checked and tested by the Contractor, in accordance with this procedure, to ensure that the system is free of shorts, open and ground faults.

b. A copy of all test reports shall be submitted to the Maintenance Supervisor for approval .

2. Test performance

a. Insulation resistance - Test all wires and cables installed under this contract (and as outlined below), with a 1000 Volt Megohmmeter (megger). Applied potential to be 1000 Volts DC for 1 minute.

Red Conductor to Black Conductor: _____ MΩ.

Red Conductor to Ground: _____ MΩ.

Black Conductor to Ground: _____ MΩ.

Red Conductor to Shield: _____ MΩ.

Black Conductor to Shield: _____ MΩ.

Shield Conductor to Ground: _____ MΩ.

b. Stray Voltage - Test all wires cables installed under this contract (and as outlined below), with the Fluke 87 Multimeter.

Red Conductor to Black Conductor: _____ AC Volts.

Red Conductor to Black Conductor: _____ DC Volts.

c. Resistance - Test all wires and cables installed under this contract (and as outline below), with the Fluke 87 Multimeter.

Red Conductor to Black Conductor: _____ Ohms.

d. A copy of all test results reports (see sample test results report), shall be submitted to the Maintenance Supervisor for approval.

e. After all test result reports have been approved by the Maintenance Supervisor, contractor shall remove temporary test connections and connect all wiring as shown on the Contract Drawings.

2.03 ALD LOOP

A. SEQUENTIAL TEST PROCEDURES

1. Install all field wiring (including stripping of the cable jacket and conductor insulation), heat shrinking and labeling. No connections to be made.

2. Visually inspect cables for physical damage and proper connection, in accordance with the Contract Drawings.

3. "Ring out" all circuits to verify continuity, proper markings and location

4. Splice through all open connections (except the homerun to TSC, and last device cable end), using a temporary "wire-nut" approved by the Engineer.

5. Perform insulation resistance, stray voltage and capacitance tests.

6. Apply a short between the red and the black conductors at the last device cable end, using a temporary "wire-nut" approved by the Engineer and perform resistance test.

7. After all testing, remove temporary "wire-nuts" and connect ALD devices.

B. EXECUTION

1. General

   a. Wiring shall be checked and tested by the Contractor, in accordance with this procedure, to ensure that the system is free of shorts, open and ground faults.

   b. A copy of all test reports shall be submitted to the Maintenance Supervisor for approval .

2. Test performance

   a. Insulation resistance - Test all wires and cables installed under this contract (and as outlined below), with a 1000 Volt Megohmmeter (megger). Applied potential to be 1000 Volts DC for 1 minute.

      Red Conductor to Black Conductor: _____ MΩ.

      Red Conductor to Ground: _____ MΩ.

      Black Conductor to Ground: _____ MΩ.

      Red Conductor to Shield: _____ MΩ.

      Black Conductor to Shield: _____ MΩ.

      Shield Conductor to Ground: _____ MΩ.

   b. Stray Voltage - Test all wires cables installed under this contract (and as outlined below), with the Fluke 87 Multimeter.

      Red Conductor to Black Conductor: _____ AC Volts.

      Red Conductor to Black Conductor: _____ DC Volts.

   c. Capacitance - Test all wires and cables installed under this contract (and as outlined below), with the Fluke 87 Multimeter.

Red Conductor to Black Conductor: _____ µF.

Red Conductor to Shield: _____ µF.

Black Conductor to Shield: _____ µF.

d. Resistance - Test all wires and cables installed under this contract (and as outline below), with the Fluke 87 Multimeter.

Red Conductor to Black Conductor: _____ Ohms.

e. A copy of all test results reports (see sample test results report), shall be submitted to the Maintenance Supervisor for approval.

f. After all test result reports have been approved by the Maintenance Supervisor, contractor shall remove temporary test connections and connect all wiring as shown on the Contract Drawings.

END OF SECTION

UILDING: 1WTC(NT) 2WTC(ST) 4WTC(SE) 5WTC(NE) CONCS(CS) SUBGRD (SG) TENANT: _____

LOOR: _____ CONTRACTOR: _____

ALD
FIELD CIRCUIT TEST REPORT

ALD CIRCUIT DESIGNATION (Label)	INSULATION RESISTANCE						STRAY VOLTAGE		CAPACITANCE			RESISTANCE	LENGTH
	Red to Black (MΩ)	Red to Ground (MΩ)	Black to Ground (MΩ)	Red to Shield (MΩ)	Black to Shield (MΩ)	Shield to Ground (MΩ)	Red to Black (VAC)	Red to Black (VDC)	Red to Black (μF)	Red to Shield (μF)	Black to Shield (μF)	Red to Black (Ω)	Cable End to End (Feet)
ALD-													
ALD-													
ALD-													
ALD-													
ALD-													
ALD-													
ALD-													
ALD-													
ALD-													
ALD-													

Information to the Contractor: The recommended test instrument is the Fluke 87 Multimeter. The meter should have been calibrated within the last 12 months. Attention should be made s to the measurement scale and or range requested on this form. This information can be found at the top of each column in brackets ( ). Incorrect scale and or range settings will sult in readings that do not correlate with acceptable values resulting in possible rejection and resubmission. All Tests are made prior to device installation with circuit wiring stripped, haped, shrunk, labelled and temporarily spliced through at device locations. Alteration of conductors except for final and device connections will result in mandatory retesting. sulation Resistance / 1000 VDC- 1 Minute in MegaOhms far end open, Stray Voltage in Volts AC & DC far end open, Capacitance in MicroFarads far end open, Resistance in Ohms far end shorted. ength Measurement is End to End Distance of the Cable Assembly, not the combined length of the individual conductors.

12/15/98 CP/SP JD

otes:

sts Performed:	Date Submitted:	WORLD TRADE CENTER	Date: [APPROVED] [REJECTED]	Date Filed.
:	By:	MXLV BASE BUILDING FIRE ALARM SYSTEM	By:	By:

JILDING: 1WTC(NT) 2WTC(ST) 4WTC(SE) 5WTC(NE) CONCS(CS) SUBGRD (SG) TENANT: _____

.OOR: _____ CONTRACTOR: _____

SPEAKER

FIELD CIRCUIT TEST REPORT

SPEAKER CIRCUIT ESIGNATION (Label)	INSULATION RESISTANCE			STRAY VOLTAGE		RESISTANCE	LENGTH
	Red to Black (MΩ)	Red to Ground (MΩ)	Black to Ground (MΩ)	Red to Black (VAC)	Red to Black (VDC)	Red to Black (Ω)	Cable End to End (Feet)
PK -							
PK -							
PK -							
PK -							
PK -							
PK -							
PK -							
PK -							
PK -							
PK -							

ormation to the Contractor: The recommended test instrument is the Fluke 87 Multimeter. The meter should have been calibrated within the last 12 months. Attention should be made to the measurement scale and or range requested on this form. This information can be found at the top of each column in brackets ( ). Incorrect scale and or range settings will sult in readings that do not correlate with acceptable values resulting in possible rejection and resubmission. All Tests are made prior to device installation with circuit wiring stripped, aped, shrunk, labelled and temporarily spliced through at device locations. Alteration of conductors except for final and device connections will result in mandatory retesting. sulation Resistance / 1000 VDC- 1 Minute in MegaOhms far end open, Stray Voltage in Volts AC & DC far end open, Resistance in Ohms far end shorted. ngth Measurement is End to End Distance of the Cable Assembly, not the combined length of the individual conductors.

12/16/98 CPY/SP-JD

tes:

e Performed:	Date Submitted:	WORLD TRADE CENTER	Date: [APPROVED] [REJECTED]	Date Filed:
	By:	MXLV BASE BUILDING FIRE ALARM SYSTEM	By:	By:

ILDING: 1WTC(NT) 2WTC(ST) 4WTC(SE) 5WTC(NE) CONCS(CS) SUBGRD (SG) TENANT: _____

OOR: _____ CONTRACTOR: _____

STROBE
FIELD CIRCUIT TEST REPORT

STROBE CIRCUIT ESIGNATION (Label)	INSULATION RESISTANCE						STRAY VOLTAGE		RESISTANCE	LENGTH
	Red to Black (MΩ)	Red to Ground (MΩ)	Black to Ground (MΩ)	Red to Shield (MΩ)	Black to Shield (MΩ)	Shield to Ground (MΩ)	Red to Black (VAC)	Red to Black (VDC)	Red to Black (Ω)	Cable End to End (Feet)
;R -										
;R -										
;R -										
;R -										
;R -										
;R -										
;R -										
;R -										
;R -										
;R -										

ormation to the Contractor: The recommended test instrument is the Fluke 87 Multimeter. The meter should have been calibrated within the last 12 months. Attention should be made to the measurement scale and or range requested on this form. This information can be found at the top of each column in brackets ( ). Incorrect scale and or range settings will ;ult in readings that do not correlate with acceptable values resulting in possible rejection and resubmission. All Tests are made prior to device installation with circuit wiring stripped, aped, shrunk, labelled and temporarily spliced through at device locations. Alteration of conductors except for final and device connections will result in mandatory retesting. :ulation Resistance / 1000 VDC- 1 Minute in MegaOhms far end open, Stray Voltage in Volts AC & DC far end open, Resistance in Ohms far end shorted. ngth Measurement is End to End Distance of the Cable Assembly, not the combined length of the individual conductors.

12/15/05 CP/SP-JD

tes:

e Performed:	Date Submitted:	WORLD TRADE CENTER	Date: [APPROVED] [REJECTED]	Date Filed.
	By:	MXLV BASE BUILDING FIRE ALARM SYSTEM	By:	By:

The Port Authority of NY & NJ	WTC BASE BUILDING FIRE ALARM SYSTEM CONTRACTOR TIE-IN & PRE-TEST CHECKLIST	Electrical Operations and Maintenance

This checklist is designed to assist the contractor, to reduce construction delays, accelerate tenant occupancy, increase productivity and reduce delivered costs. The items listed are required to be completed prior to the scheduling of the WTC Base Building Fire Alarm System Tie-In and Pre-Testing.

Please direct completed forms, scheduling and technical requests to Mr Ray Simonetti, at 212-435-5005

>>>>> 24 Hour Advance Notice Required Prior to Tie-In and Pre Testing Scheduling <<<<<

1 TENANT Name _____ (PRINT)

2 BLDG Location 1WTC 2 WTC 4WTC 5WTC CONCOURSE SUBGRADE (CIRCLE)

3 BLDG Floor: _____ (PRINT)

4 CONTRACTOR Name: _____ (PRINT)

5	Wire Test Results - Submitted, Corrected as Required and Approved.	[ ] Completed	[ ] Not Applicable
6	Speaker/Strobe Wiring in TSC, ALD Wiring in ATC Ready for Tie-In.	[ ] Completed	[ ] Not Applicable
7	Speakers set at selected power levels and installed. *(Power setting ,in Watts, per Design)*	[ ] Completed	[ ] Not Applicable
8	Strobes match selected power levels and installed. *(Power setting ,in Candela, per Design)*	[ ] Completed	[ ] Not Applicable
9	Smoke Detectors programmed, labelled and installed.	[ ] Completed	[ ] Not Applicable
10	TRI Interfaces programmed, labelled and installed.	[ ] Completed	[ ] Not Applicable
11	Waterflow and Tamper Devices Installed and Operational.	[ ] Completed	[ ] Not Applicable
12	Tenant SubSystem(s) Installed and Operational.	[ ] Completed	[ ] Not Applicable
13	Fire Alarm Drawings - As Installed including all Changes. *(2 Sets - Submitted in Advance to PA O&M Electrical Supervisor)*	[ ] Completed	[ ] Not Applicable
14	Architect, Engineer, and General Contractor concur with Status.	[ ] Completed	[ ] Not Applicable

15 **I certify that the WTC Base Building Fire Alarm Work required for the referenced Tenant Project has been completed in its entirety compliant with the Plans and Specifications submitted and Released, and I am ready for the System Pretest**

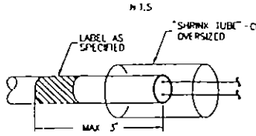
FAX COMPLETED FORMS TO:
Mr Ray Simonetti
WTC O&M - Electrical
1-212-435-5717

16 Signed: _____

17 Date: _____

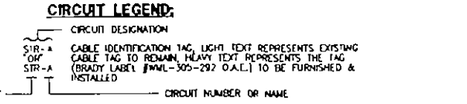
TYPICAL CABLE LABELING METHOD

N.T.S



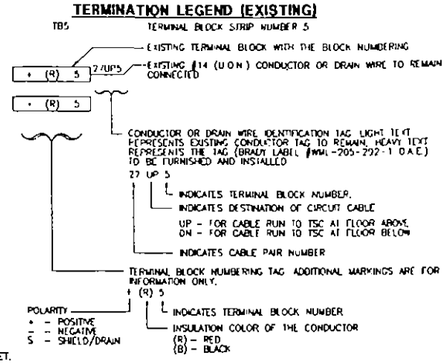
- APPLY LABEL TO OUTER JACKET OF CABLE MAXIMUM OF 3" FROM STRIPPED END AS SHOWN NOT TO BE COVERED BY OVERSIZED SHRINK
- DETAIL APPLIES TO ALL CABLE TYPES

CIRCUIT LEGEND:



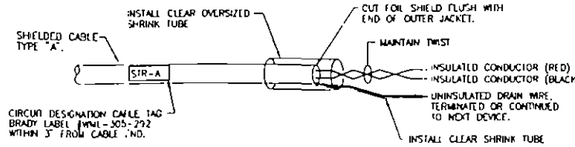
STR	- STROBE CIRCUIT	A TO C	- STROBE OR SPEAKER CIRCUIT NUMBER
SPK	- SPEAKER CIRCUIT.	ATC	- CIRCUIT TO ADDRESSABLE TERMINAL STRIP CABINET.
ALD	- ALD LOOP DEVICE CIRCUIT (EXCEPT SMOKE DETECTOR).	PS	- CIRCUIT TO PULL STATIONS
TEL	- TELEPHONE CIRCUIT	ELEV	- CIRCUIT TO ELEVATOR LOBBY AND ELEVATOR MACHINE ROOM SMOKE DETECTORS
SD	- SMOKE DETECTOR CIRCUIT	HVAC	- CIRCUIT TO HVAC SMOKE DETECTOR
12D	- CABLE PAIR #12 RUNNING DOWN TO TSC-1/F (FLOOR BELOW)	AREA	- CIRCUIT TO OPEN AREA SMOKE DETECTOR
12U	- CABLE PAIR #12 RUNNING UP TO TSC-1/F (FLOOR ABOVE).	IC	- INTERFACE CABINET CIRCUIT
12M	- CABLE PAIR #12 RUNNING FROM WIRELESS (TRANSPONDER)	MPJ	- MAINTENANCE PHONE JACK CIRCUIT
		WP	- WARDEN TELEPHONE CIRCUIT
		SJ	- STAND PIPE PHONE JACK CIRCUIT

TERMINATION LEGEND (EXISTING)



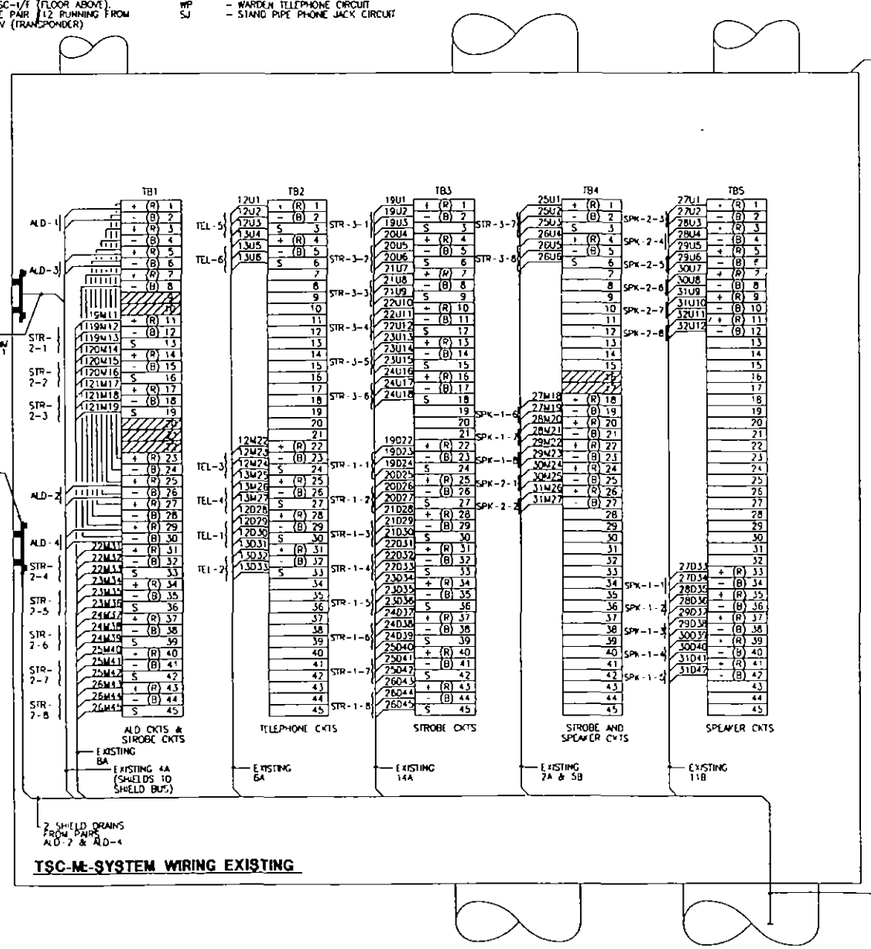
TYPICAL SHIELD/DRAIN INSULATING METHOD "A"

N.T.S

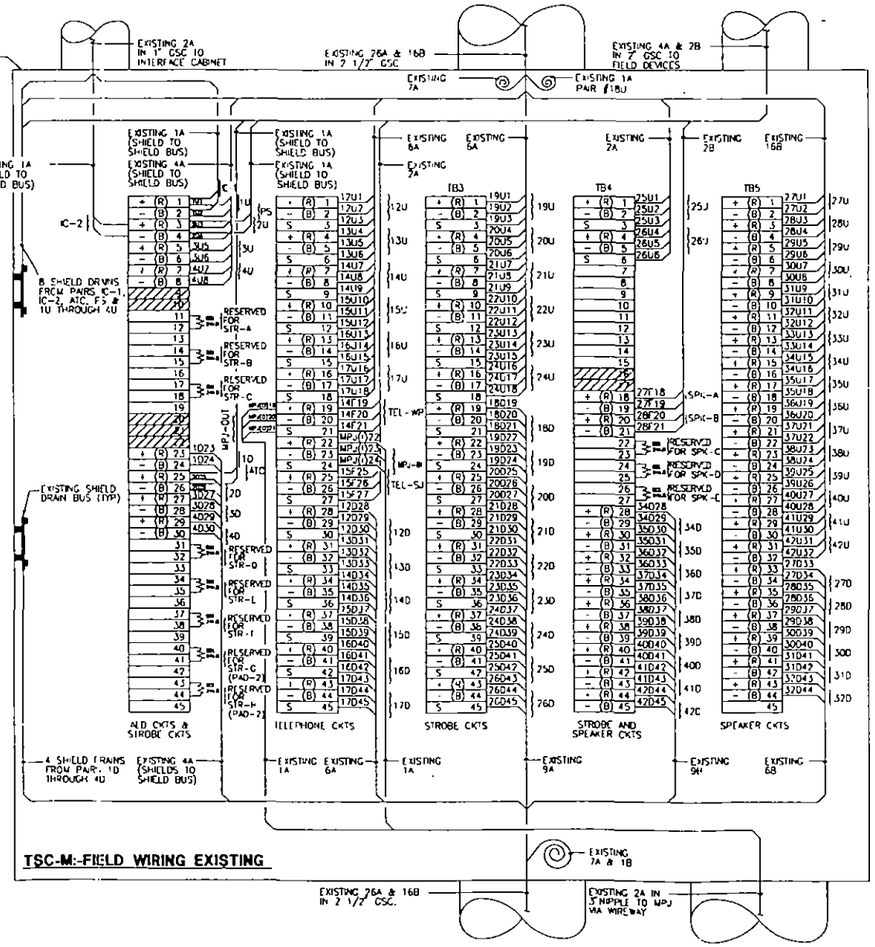


NOTES:

1. FOR LEGEND, ABBREVIATIONS & GENERAL NOTES SEE DWG E-1.
2. ALL SHIELDS MUST BE ISOLATED FROM GROUND APPROVED "SHRINK" TUBING SHALL BE USED ON ALL DRAIN CONDUCTORS SEE TYPICAL "SHIELD/DRAIN INSULATING METHOD "A" ON THIS DWG.
3. ALL WIRING SHALL BE FREE OF GROUND FAULTS, OPENS, SHORTS & STRAY VOLTAGES.
4. ALL TSC-1 AND/OR TSC-1F ASSOCIATED WITH THIS TSC-M SHALL BE MODIFIED SIMULTANEOUSLY FOR THE COMPLETE MODIFICATION SCOPE. REFER EXISTING TSC BLOCK WIRING DIAGRAM
5. ALL WORK SHALL BE DONE IN THE PRESENCE OF THE ENGINEER



TSC-M-SYSTEM WIRING EXISTING



TSC-M:-FIELD WIRING EXISTING

Sheet of

ISSUES

No.	Date	Revision	Approved

SAMPLE

FOR REFERENCE USE ONLY

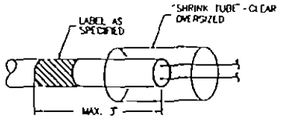
Designed by Drawn by Checked by

Date

Contract Number Drawing Number

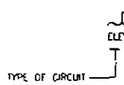
TYPICAL CABLE LABELING METHOD

N.T.S.



- APPLY LABEL TO OUTER JACKET OF CABLE. MAXIMUM OF 3" FROM STRIPPED END AS SHOWN NOT TO BE COVERED BY OVERSIZED SHRINK
- DETAIL APPLIES TO ALL CABLE TYPES

CIRCUIT LEGEND:

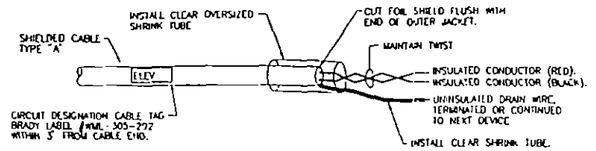


CABLE IDENTIFICATION TAG, LIGHT TEXT REPRESENTS EXISTING CABLE TAG TO REMAIN, HEAVY TEXT REPRESENTS THE TAG (BRADY LABEL #WML-305-792 O.A.E.) TO BE FURNISHED & INSTALLED.

ELEV - CIRCUIT TO ELEVATOR LOBBY SMOKE DETECTORS.
HVAC - CIRCUIT TO HVAC SMOKE DETECTORS.
AREA - CIRCUIT TO OPEN AREA SMOKE DETECTORS
TEN1 - CIRCUIT TO TENANT ALD LOOP DEVICES
TEN2 - CIRCUIT TO TENANT ALD LOOP DEVICES

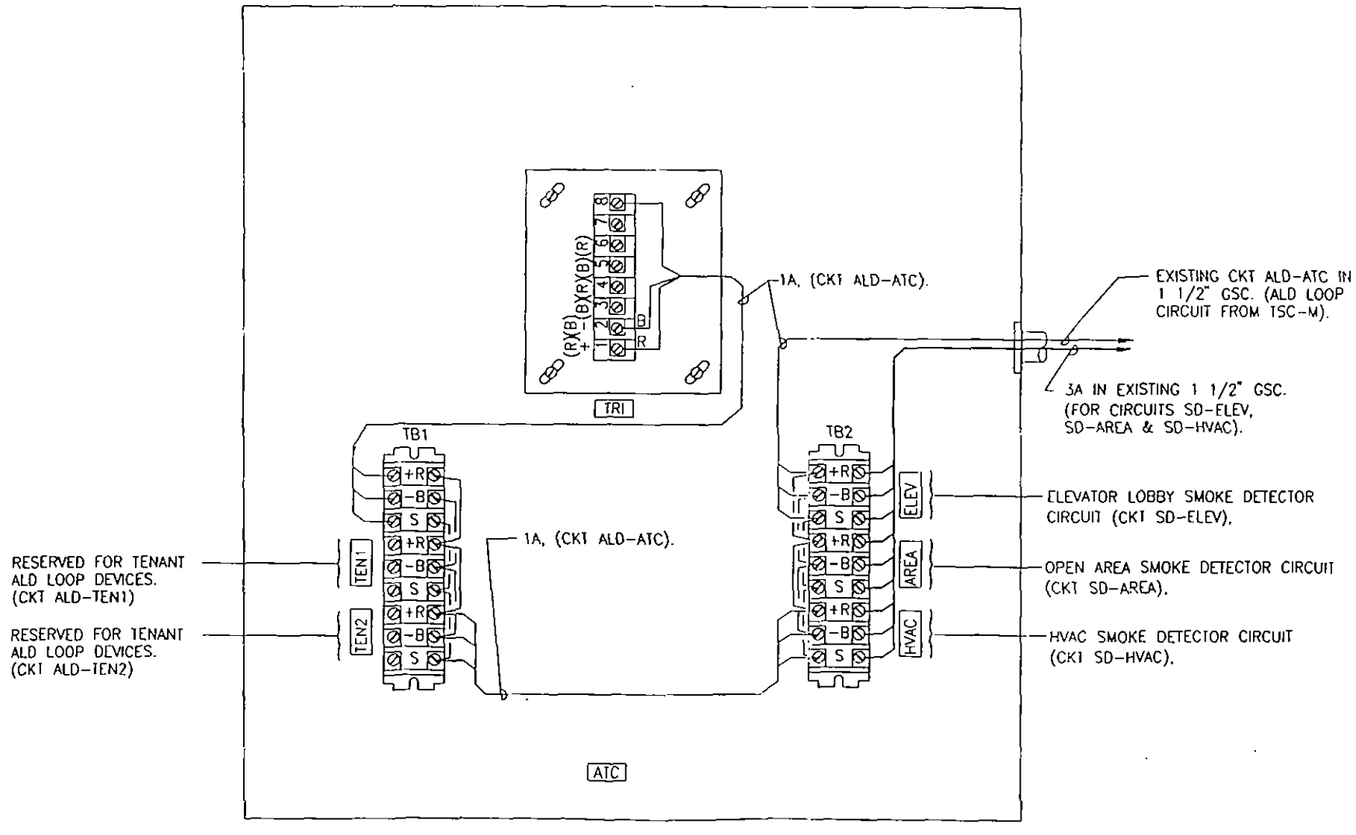
TYPICAL SHIELD/DRAIN INSULATING METHOD "A"

N.T.S.



NOTES:

1. FOR LEGEND, ABBREVIATIONS & GENERAL NOTES, SEE DWG E-1
2. ALL SHIELDS MUST BE ISOLATED FROM GROUND. APPROVED "SHRINK" TUBING SHALL BE USED ON ALL DRAIN CONDUCTORS. SEE TYPICAL SHIELD/DRAIN INSULATING METHOD "A" ON THIS DWG
3. ALL WIRING SHALL BE FREE OF GROUND FAULTS, OPENS, SHORTS & STRAY VOLTAGES.
4. ALL WORK SHALL BE DONE IN THE PRESENCE OF THE ENGINEER. FINAL TERMINATIONS OF FIELD CIRCUITS TO BE DONE BY OTHERS



ATC CABINET
BLOCK WIRING DIAGRAM

N.T.S.

Sheet of

ISSUES

No.	Date	Revision	Approved

SAMPLE

FOR REFERENCE USE ONLY

Title

Designed by | Drawn by | Checked by

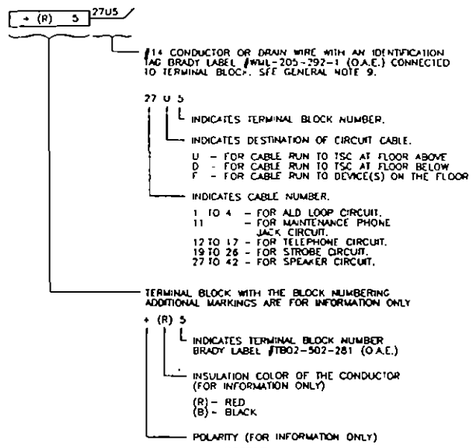
Date

Contract Number | Drawing Number

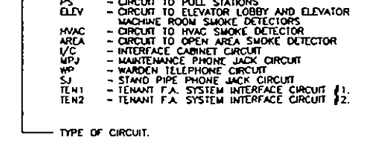
ABBREVIATIONS

ALD	ANALOG LOOP DRIVER
ATC	ADDRESSABLE TERMINAL CABINET
CKT	CIRCUIT
cd	CANDELLA
DWG	DRAWING
EL	ELECTRIC
ELEV	ELEVATOR
EMR	ELEVATOR MACHINE ROOM
EXIST	EXISTING
F.A.	FIRE ALARM
FL	FLOOR
F C O	FUSE CUTOUT
F M C.	FLEXIBLE METALLIC CONDUIT
GND	GROUND
GSC	GALVANIZED STEEL CONDUIT
MER	MECHANICAL EQUIPMENT ROOM
MTD	MOUNTED
N T.S	NOT TO SCALE
O.A.E.	OR APPROVED EQUAL
PS	PULL STATION
P.B	PULL BOX
SPK	SPEAKER
STR	STROBE
TL	TELEPHONE
TRI	ADDRESSABLE INTERFACE MODULE
TSC	TERMINAL STRIP CABINET
U O.N.	UNLESS OTHERWISE NOTED
W	WATT
WTC	WORLD TRADE CENTER

TERMINATION LEGEND



CIRCUIT LEGEND



LEGEND/SPECIFICATION

HEAVY LINE INDICATES WORK TO BE DONE

HEAVY DASHED LINE INDICATES DEVICE AND/OR CIRCUITRY TO BE REMOVED

LIGHT LINE INDICATES EXISTING DEVICE AND/OR CIRCUITRY TO REMAIN

DASHED LIGHT LINE INDICATES FUTURE WORK BY OTHERS

3/4" GSC — FIRE ALARM CABLE IN 3/4" GALVANIZED STEEL CONDUIT.

3/4" GSC — CABLE ENTERING LENGTH OF 3/4" GALVANIZED STEEL CONDUIT. END OF CONDUIT TO HAVE BUSHING

NUMBER OF CABLES

2A OR B — TYPE OF CABLE:

A - 2#14 AWG 200°C, SHIELDED TWISTED PAIR TEFLON CABLE, CLASS E, AND BSA APPROVED N.Y.C. FOR LOCAL LAW #5

B - 2#14 AWG 200°C, UNSHIELDED TWISTED PAIR TEFLON CABLE, CLASS E, AND BSA APPROVED N.Y.C. FOR LOCAL LAW #5.

S 1/2w — RECESSED CEILING MOUNTED ROUND SPEAKER, WHEELOCK MODEL #E90-W WITHOUT SUBSTITUTION TAP SETTING AS INDICATED.

S 1/2w — WALL MOUNTED SQUARE SPEAKER, WHEELOCK MODEL #E70-R WITH SBB BACKBOX WITHOUT SUBSTITUTION. TAP SETTING AS INDICATED

15cd — FLUSH MOUNTED STROBE. THE NUMERAL INDICATES STROBE CANDELA RATING, TYPE AND MODEL # AS FOLLOWS:

15cd - 15 CANDELA STROBE, WHEELOCK MODEL #RSS-2415W-FR WITHOUT SUBSTITUTION.

30cd - 30 CANDELA STROBE, WHEELOCK MODEL #RSS-2430W-FR WITHOUT SUBSTITUTION.

75cd - 75 CANDELA STROBE, WHEELOCK MODEL #RSS-2475W-FR WITHOUT SUBSTITUTION.

110cd - 110 CANDELA STROBE, WHEELOCK MODEL #RSS-24110W-FR WITHOUT SUBSTITUTION.

75cd 1/2w — SURFACE MOUNTED COMBINATION STROBE/SPEAKER UNIT, LISTED WITH RESPECTIVE CANDELA RATED STROBE, AND INSTALLED USING BACK BOX WHEELOCK MODEL #SBB, WITHOUT SUBSTITUTIONS. THE NUMERALS, WITH SUFFIX "W" INDICATES SPEAKER TAP SETTING AND SUFFIX "cd" INDICATES STROBE CANDELA RATING AS FOLLOWS:

15cd - 15 CANDELA STROBE WITH SPEAKER, WHEELOCK MODEL #E70-2415W-FR WITHOUT SUBSTITUTION.

30cd - 30 CANDELA STROBE WITH SPEAKER, WHEELOCK MODEL #E70-2430W-FR WITHOUT SUBSTITUTION.

75cd - 75 CANDELA STROBE WITH SPEAKER, WHEELOCK MODEL #E70-2475W-FR WITHOUT SUBSTITUTION.

110cd - 110 CANDELA STROBE WITH SPEAKER, WHEELOCK MODEL #E70-24110-FR WITHOUT SUBSTITUTION.

XXX-XXX — ALD LOOP DEVICE ADDRESS; FIRST THREE DIGITS REPRESENT NETWORK/LOOP ADDRESS (AS DIRECTED BY ENGINEER), AND LAST THREE DIGITS REPRESENT DEVICE ADDRESS

S R -XXX — ADDRESSABLE SMOKE DETECTOR PYROTRONICS MODEL #FP-11 WITH MOUNTING BASE PYROTRONICS MODEL #DB-11 WITHOUT SUBSTITUTIONS. "-XXX" REPRESENTS LAST THREE DIGIT DEVICE ADDRESS ONLY. CONTRACTOR SHALL TAG DETECTOR HEAD AND BASE WITH COMPLETE SIX DIGIT DEVICE ADDRESS (INCLUDING NETWORK/LOOP AND DEVICE ADDRESSES) AS SHOWN ABOVE. THE SINGLE DIGIT NUMERAL INDICATES INSTALLATION METHOD AS FOLLOWS:

R - PLENUM MOUNTED (IN FRONT OF RETURN AIR GRILL). FOR INSTALLATION, SEE DETAIL "F" ON REFERENCE DRAWING E-2.

D - DUCT MOUNTED WITH HOUSING AND SAMPLING TUBE PYROTRONICS MODEL #AD-3ULP AND STAB-X, WITHOUT SUBSTITUTIONS. SAMPLING TUBE SIZE TO BE FIELD DETERMINED BASED ON THE DUCT SIZE. FOR INSTALLATION, SEE DETAIL "H" ON DRAWING E-2 AND INSTRUCTIONS ON DRAWING M-1.

1 - SUSPENDED CEILING/DRY WALL MOUNTED. FOR INSTALLATION, SEE DETAIL "E" ON DRAWING E-2.

2 - SURFACE MOUNTED (FOR OPEN CEILING AREA ONLY). FOR INSTALLATION, SEE DETAIL "G" ON DRAWING E-2.

TRI — ADDRESSABLE INTERFACE MODULE (TRI) PYROTRONICS MODEL #TRI-B6R, WITHOUT SUBSTITUTION WITH ISOLATION RELAY SQUARE D MAKE GENERAL PURPOSE TYPE, KP12 (O.A.E) AND RELAY BASE MOUNTED IN 6" DEEP RED PAINTED NEMA 1 ENCLOSURE. THE ENCLOSURE SHALL BE SIZED BASED ON NUMBER OF DEVISES U.O.N. ON PLAN DRAWINGS.

CR — ADDRESSABLE INTERFACE MODULE (TRI) PYROTRONICS MODEL #TRI-B6D, WITHOUT SUBSTITUTION FOR MOUNTING TYPE AND INSTALLATION, SEE APPLICABLE DETAIL "I" OR "J" ON DRAWING E-2.

PB — PULL BOX

TSC — EXISTING TERMINAL STRIP CABINET

ATC — EXISTING ADDRESSABLE TERMINAL CABINET

GENERAL NOTES

1. ALL FIRE ALARM CABLES SHALL BE TYPE FPLP-UL TWISTED PAIR #14 GAUGE SOLID COPPER, 200°C, 600V, SHIELDED (EXCEPT FOR SPEAKERS WHICH USE UNSHIELDED), INSULATED CONDUCTORS, CLASS "E", BSA AND MEA APPROVED FOR NYC LOCAL LAW #5 WITH FEP (TEFLON OR APPROVED EQUAL) INSULATION, AND CONDUCTORS COLORED BLACK & RED. ALL FIRE ALARM CABLES WILL BE FURNISHED AND INSTALLED BY THE CONTRACTOR. ALL CABLES INSTALLED IN HUNG CEILING AND ABOVE SHEETROCK CEILING SHALL BE MOUNTED AND SUPPORTED ABOVE THE CEILING AND INSTALLED WITHOUT CONDUITS, UNLESS OTHERWISE NOTED. ALL OPEN AREAS AND WER'S WILL UTILIZE CONDUITS.
2. ASSEMBLE DRAIN WIRE AT BOTH ENDS OF SHIELDED CABLES USING TYPICAL SHIELD/DRAIN INSULATING METHOD AS SHOWN ON DRAWING E-3. SHIELD MUST BE CONTINUOUS THROUGHOUT THE CIRCUIT AND INSULATED.
3. PROGRAMMING OF BASE BUILDING SYSTEM FIRE ALARM PANELS WILL BE BY THE AUTHORITY. PROGRAMMING OF ALL ADDRESSABLE DEVICES (SMOKE DETECTORS & TRI'S) SHALL BE BY THE CONTRACTOR. FINAL CONFIRMATION OF ADDRESSES SHALL BE AS DIRECTED BY ENGINEER, PRIOR TO PROGRAMMING DEVICES.
4. SET TAP SETTINGS ON ALL SPEAKERS (AS SHOWN ON DWG'S). PRIOR TO INSTALLATION.
5. ALL CONDUITS SHALL BE RIGID STEEL, HOT DIPPED GALVANIZED WITH THREADED FITTINGS (U.O.N.)
6. ALL PENETRATIONS MADE IN EXISTING FIRE ALARM EQUIPMENT SHALL BE MADE IN THE PRESENCE OF THE ENGINEER. NO TOP PENETRATIONS SHALL BE MADE IN ANY FIRE ALARM PANELS.
7. PATCH & SEAL PENETRATIONS FROM ALL CONDUITS PASSING THRU WALLS, FIRE RATED CONSTRUCTION AND PLENUMS, WITH THERMAFIBER (O.A.E.).
8. FOR MOUNTING DETAILS AND WIRING DIAGRAMS OF SPEAKERS, STROBES AND SMOKE DETECTORS AND TRI'S SEE DWG E-2. NO "T" TAPPING WILL BE PERMITTED. ALL BOX COVERS, CONDULET COVERS, ETC. SHALL BE PAINTED RED.
9. FINAL CONNECTIONS IN THE TSC AND ATC CABINETS WILL BE MADE BY OTHERS. SHAPING AND LABELING OF ALL CABLES AT EXISTING TSC'S AND ATC'S SHALL BE PERFORMED BY THE CONTRACTOR. THIS WORK SHALL BE DONE IN THE PRESENCE OF THE ENGINEER.
10. CONTRACTOR SHALL USE BRADY LABELS #WML-205-292-1 (O.A.E.) FOR LABELLING OF ALL CONDUCTORS AND #WML-305-292 (O.A.E.) FOR LABELING OF ALL CABLES.
11. UNDER THE DIRECTION OF THE ENGINEER, CONTRACTOR SHALL REMOVE EXISTING CEILING SURFACE MOUNTED SPEAKERS & SMOKE DETECTORS ONLY AFTER DEVICES TO BE INSTALLED ARE OPERATIONAL.
12. ALL EQUIPMENT SHOWN TO BE REMOVED SHALL HAVE ITS ASSOCIATED TERMINATION WIRING ABANDONED AND TAPED IN PLACE. ENDS OF ABANDONED CABLES SHALL BE TAGGED "NOT IN USE".
13. PRIOR TO INSTALLATION CONTRACTOR SHALL TEST, IN THE PRESENCE OF THE ENGINEER, ALL REELS OF FIRE ALARM CABLES FOR CONTINUITY AND SHORT CIRCUITS.
14. FIRE ALARM CABLES SHALL BE TESTED IN ACCORDANCE TO THE AUTHORITY'S ENGINEERING TEST PROCEDURES. ALL TEST RESULTS SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.
15. SMOKE DETECTORS ARE REQUIRED AT ALL RETURN AIR GRILLS. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY UPON DISCOVERING ANY RETURN AIR GRILL NOT SHOWN ON THE CONTRACT DRAWINGS AND SHALL FURNISH & INSTALL SMOKE DETECTORS.
16. AS SOON AS ACCESS TO THE CEILING AREA IS NO LONGER REQUIRED FOR THE INSTALLATION AND TESTING OF WIRING AND DEVICES, CONTRACTOR SHALL REPLACE ALL REMOVED CEILING TILES.
17. ALL FINISHES DISTURBED BY THE INSTALLATION OF DEVICES OR WIRING SHALL BE RESTORED TO THEIR ORIGINAL OR MATCHING CONDITION.
18. ALL TEMPORARY INSTALLATION AND WIRING BEING INSTALLED UNDER PHASE-I SHOULD COMPLY WITH PERMANENT INSTALLATION METHODS AND SPECIFICATIONS.

Sheet of

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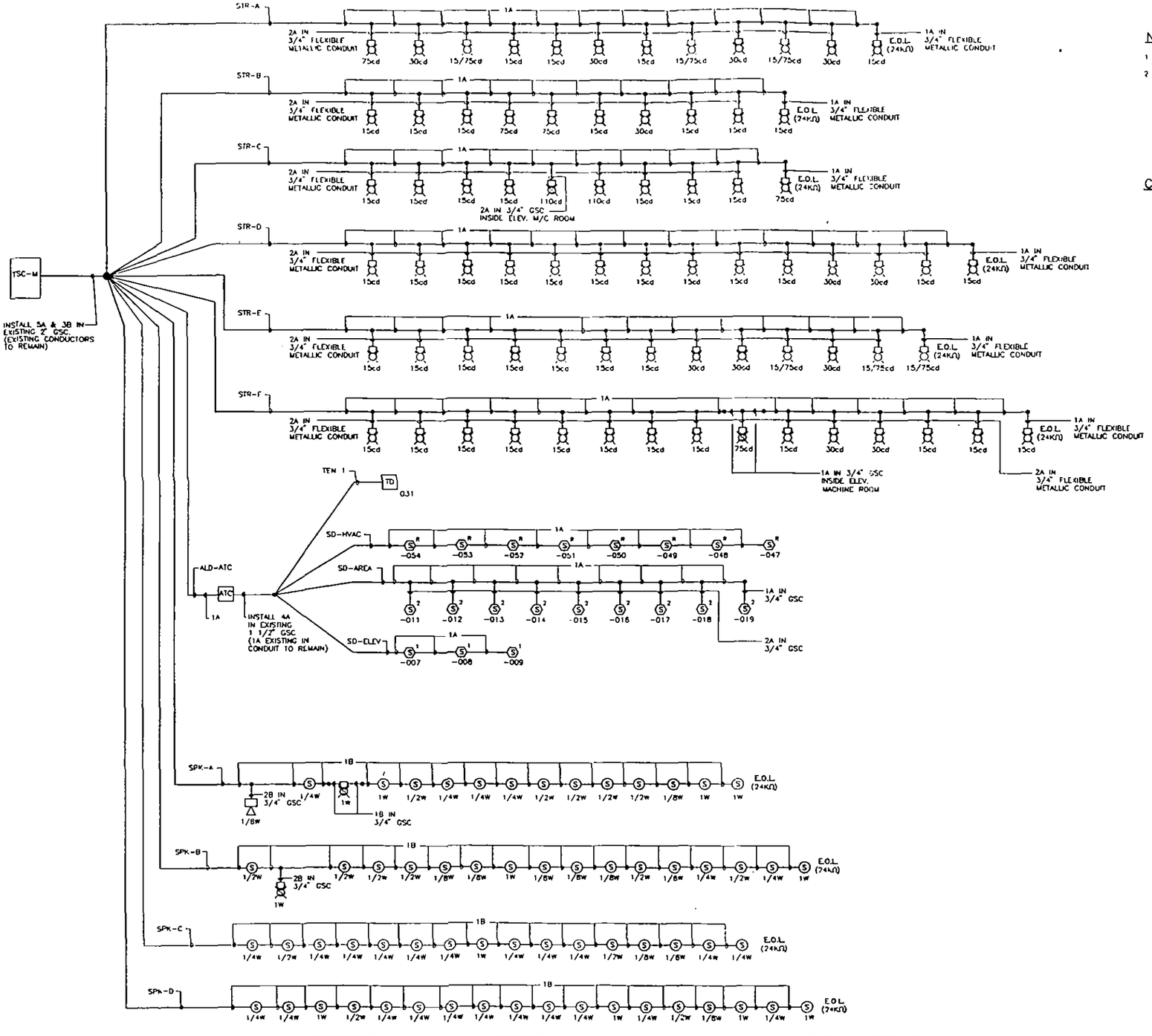

NOTE:

1. FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES, SEE DWG E-1.
2. COMBINATION SPEAKER - STROBE UNITS ARE SHOWN TWICE FOR CLARITY OF CIRCUIT IDENTIFICATION

CIRCUIT LEGEND:

STR - X

CIRCUIT DESIGNATION

CIRCUIT NUMBER OR NAME

- A TO G - STROBE AND SPEAKER CIRCUIT NUMBER
- ATC - CIRCUIT TO ADDRESSABLE TERMINAL STRIP CABINET
- ELEV - CIRCUIT TO ELEV LOBBY & ELEV MACHINE ROOM SMOKE DETECTORS
- HVAC - CIRCUIT TO HVAC SMOKE DETECTORS
- AREA - CIRCUIT TO OPEN AREA SMOKE DETECTORS

TYPE OF CIRCUIT

- STR - STROBE CIRCUIT
- SPK - SPEAKER CIRCUIT
- ALD - ALD LOOP DEVICE (EXCEPT SMOKE DETECTOR) CIRCUIT
- SD - SMOKE DETECTOR CIRCUIT

Sheet of

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No.	Date	Revision	Approved

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NOTE:

1. FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES, SEE DWG E-1.
2. FOR SMOKE DETECTOR INSTALLATION DETAILS, SEE DWG E-17
3. FOR SMOKE DETECTION/FIRE ALARM HVAC SHUTDOWN SCHEDULE, SEE DWG E-18. THIS SCHEDULE IS FOR INFORMATION ONLY AND REPRESENTS NO WORK TO THIS CONTRACTOR
4. ALL ADDRESSABLE SMOKE DETECTOR CIRCUITS RUN TO EXISTING ATC CABINET IN JANITORS CLOSET.
5. REMOVAL OF OLD SMOKE DETECTORS AND PATCHING AS PER INDICATED PATCHING DETAIL NUMBER NEXT TO THE OLD SMOKE DETECTOR WILL BE MADE BY OTHERS
6. FOR REMOVAL AND PATCHING PLAN DETAILS (P-1, P-2, P-3 & P-4), SEE DWG A-1.
7. FOR EXACT LOCATION SEE MECHANICAL REFERENCE DWG M-A-51

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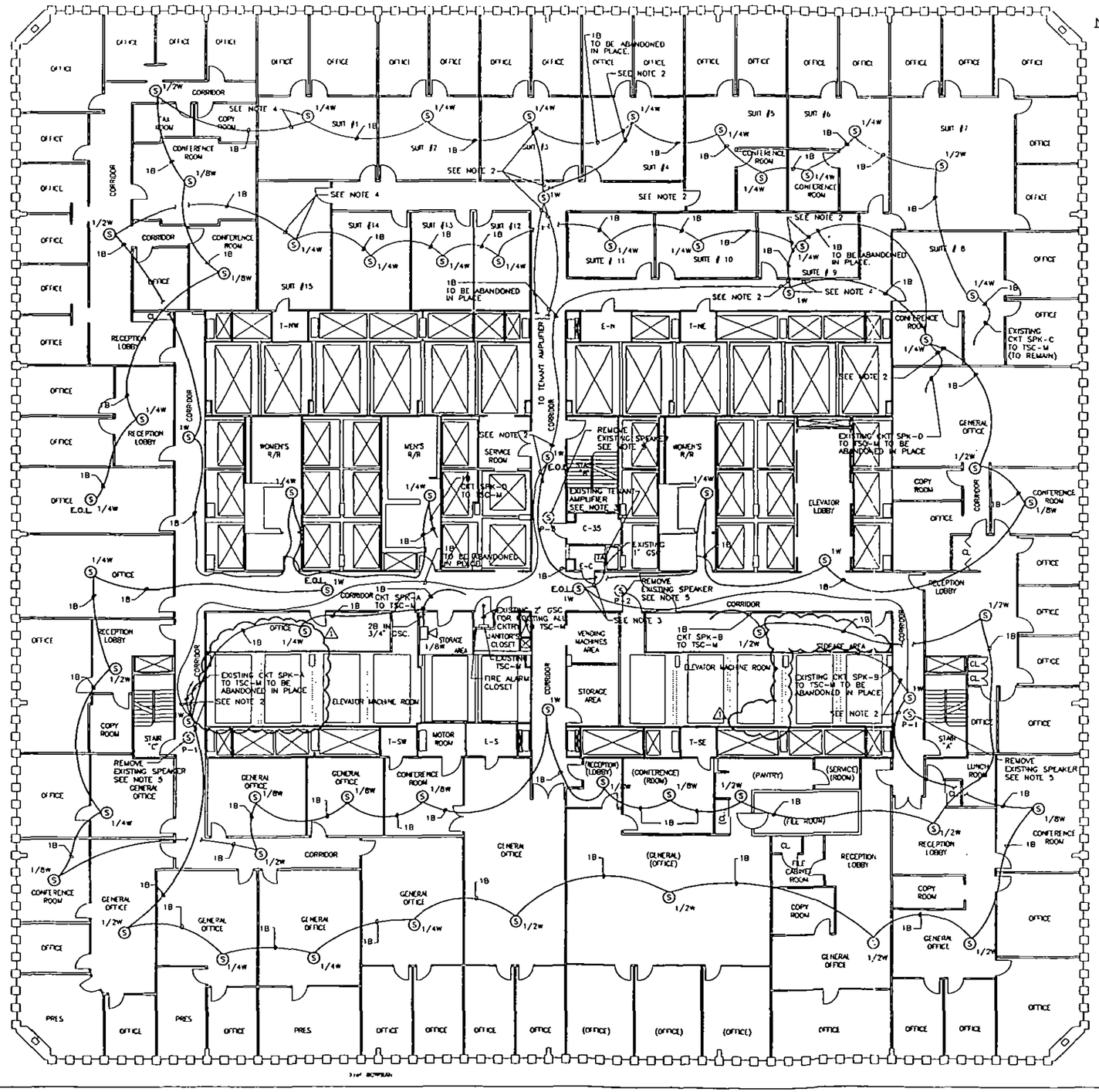

NOTE:

1. FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES, SEE DWG E-1.
2. LEAVE 3' OF COILED CABLE (TAG & TAPE CONDUCTOR ENDS) AT EXISTING SPEAKER. DISCONNECTION OF EXISTING SPEAKER CIRCUIT WIRING AND FINAL CONNECTION TO EXISTING SPEAKER WILL BE MADE BY OTHERS.
3. DISCONNECTION AND REMOVAL OF EXISTING TENANT AMPLIFIER AND ASSOCIATED WIRING UP TO THIS LAST SPEAKER, AND CONNECTION OF E.O.L. RESISTOR AT THE LAST SPEAKER WILL BE MADE BY OTHERS AFTER INSTALLED SPEAKERS ARE TESTED AND OPERATIONAL.
4. LEAVE 3' OF COILED CABLE (TAG & TAPE CONDUCTOR ENDS) AT EXISTING SPEAKER. REMOVAL OF THE EXISTING E.O.L. RESISTOR AND FINAL CONNECTION TO EXISTING SPEAKER WILL BE MADE BY OTHERS
5. REMOVE OLD SPEAKERS AS DIRECTED BY THE ENGINEER AND PROVIDE PATCHING AS PER INDICATED PATCHING DETAIL NUMBER NEXT TO THE OLD SPEAKER. DISCONNECTION OF OLD SPEAKERS WILL BE MADE BY OTHERS.
6. FOR REMOVAL AND PATCHING PLAN DETAILS (P-1, P-2, P-3 & P-4), SEE DWG A-1.
7. THIS COMBINATION SPEAKER/STROBE AND ASSOCIATE CONDUIT ARE ALSO SHOWN ON STROBE INSTALLATION PLAN DWG E-5

SPEAKER CIRCUIT/LOADING TABLE

SPEAKER TAP/dB SETTING	Watts	1/8	1/4	1/2	1	2	4	TOTAL POWER (Watts)	CIRCUIT LENGTH (ft.)
	dB	75	78	81	84	87	90		
QUANTITY OF SPEAKERS PER CIRCUIT	SPK-A	2	4	5	3	–	–	6 750	525
	SPK-B	6	2	6	2	–	–	6.250	550
	SPK-C	2	11	2	1	–	–	5 000	625
	SPK-D	1	11	2	4	–	–	7.875	465
							GRAND TOTAL	25 875	2165

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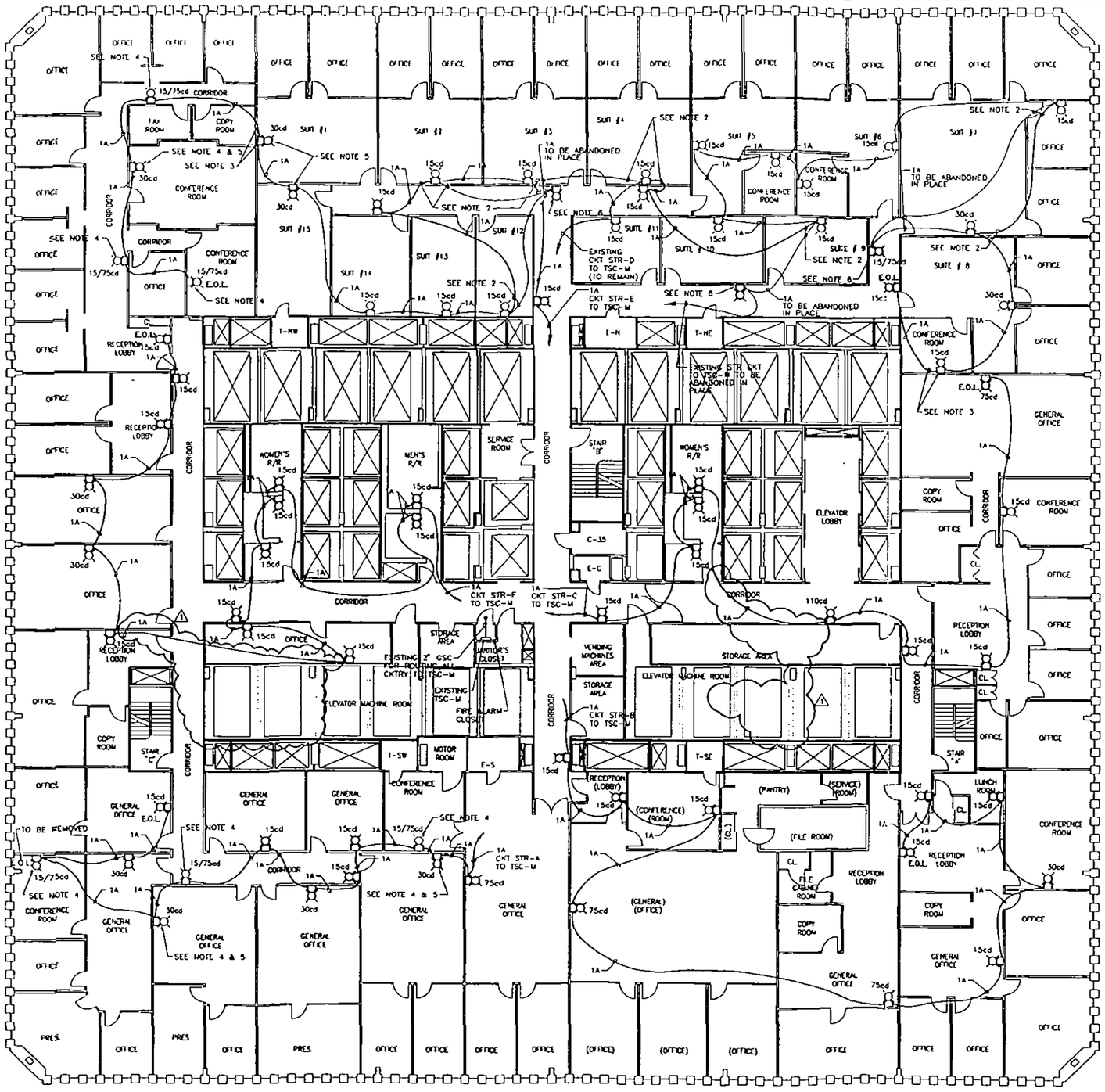

NOTE:

1. FOR LEGEND, ABBREVIATIONS AND GENERAL NOTES SEE DWG E-1.
2. LEAVE 8' COILED CABLE (TAG AND TAPE CONDUCTOR ENDS) AT EXISTING STROBE IN THE SUSPENDED CEILING DISCONNECTION OF EXISTING STROBE CIRCUIT WIRING AND FINAL CONNECTION TO TO EXISTING STROBE WILL BE MADE BY OTHERS
3. LEAVE 8' COILED CABLE (TAG AND TAPE CONDUCTOR ENDS) AT EXISTING STROBE IN THE SUSPENDED CEILING. DISCONNECTION OF EXISTING E.O.L. RESISTOR AND FINAL CONNECTION TO EXISTING STROBE WILL BE MADE BY OTHERS.
4. DISCONNECT STROBE AND ABANDON WIRING IN PLACE (TAG & TAPE CONDUCTOR ENDS), AND REWIRE AS SHOWN
5. REPLACE EXISTING STROBE WITH 30 CANDELA RATED STROBE AND WIRE AS SHOWN (UTILIZE EXISTING BACK BOX AND CONDUIT STUB)
6. AFTER INSTALLED STROBES ARE TESTED AND OPERATIONAL, REMOVE STROBE AND RETAIN TO AUTHORITY, AND INSTALL BLANK COVER PLATE AND PAINT (MATCH TO EXISTING WALL FINISH).
7. THIS COMBINATION SPEAKER/STROBE AND ASSOCIATE CONDUIT ARE ALSO SHOWN ON SPEAKER INSTALLATION PLAN DWG E-3

STROBE CIRCUIT/LOADING TABLE

STROBE TYPE AND RATING	TYPE	15cd	15/17cd (EXISTING)	30cd	75cd	110cd	CURRENT PER CIRCUIT (AMPS)	CIRCUIT LENGTH (FT.)
	CURRENT IN AMPS (A)	0.080	0.115	0.135	0.245	0.300		
QUANTITY OF STROBES PER CIRCUIT	STR-A	4	3	4	1	–	1.450	270
	STR-B	7	–	1	2	–	1.185	330
	STR-C	7	–	–	1	2	1.105	245
	STR-D	12	–	2	–	–	1.230	370
	STR-E	7	3	3	–	–	1.310	325
	STR-F	12	–	2	1	–	1.230	295
						GRAND TOTAL	7.510	1835

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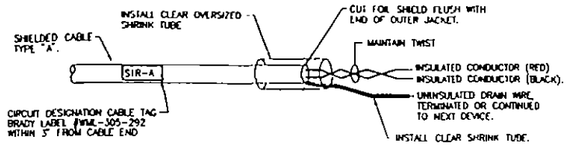
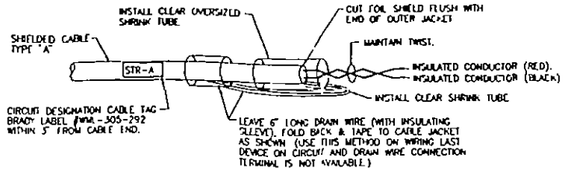
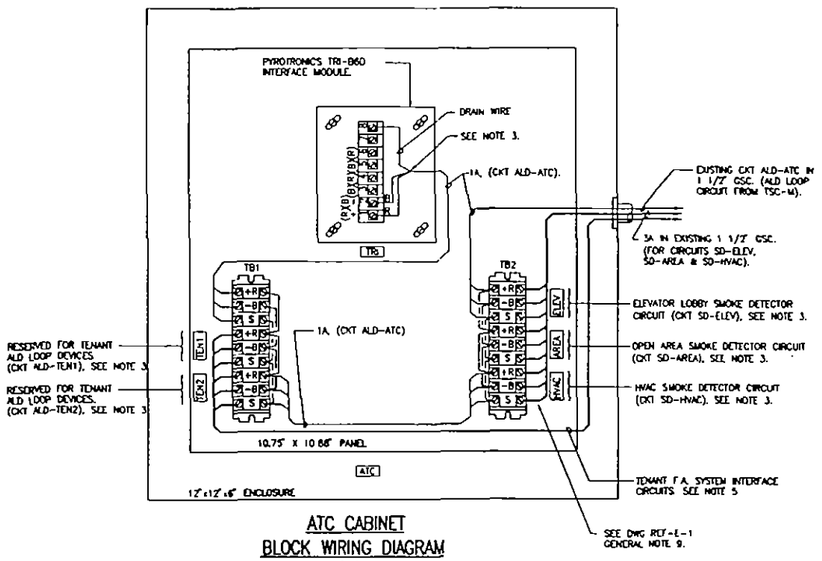


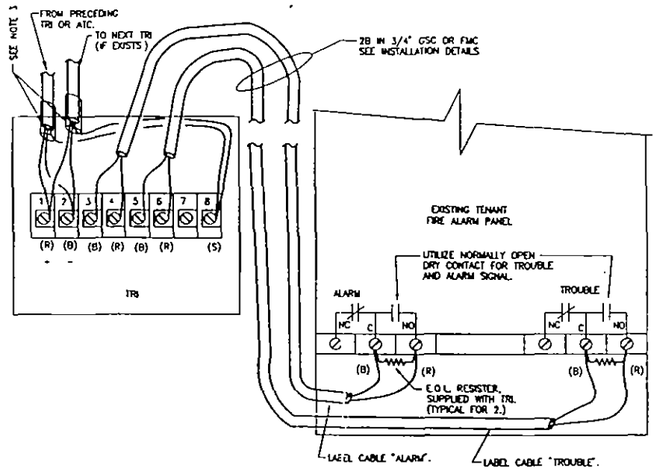
TYPICAL SHIELD/DRAIN INSULATING METHOD "A"
N.T.S



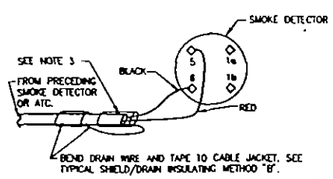
TYPICAL SHIELD/DRAIN INSULATING METHOD "B"
N.T.S



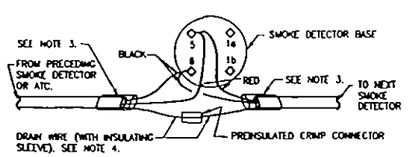
ATC CABINET
BLOCK WIRING DIAGRAM
N.T.S



TYPICAL TRI WIRING DIAGRAM OF TENANT F.A. SYSTEM INTERFACE
N.T.S

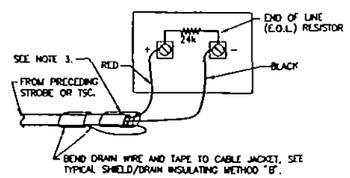


(FOR END OF LINE SMOKE DETECTORS)

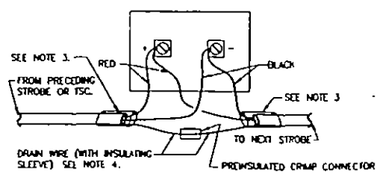


(FOR ALL SMOKE DETECTORS EXCLUDING END OF LINE SMOKE DETECTORS)

TYPICAL SMOKE DETECTOR WIRING DIAGRAM
N.T.S

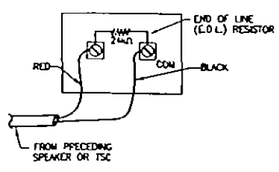


(FOR END OF LINE STROBES)

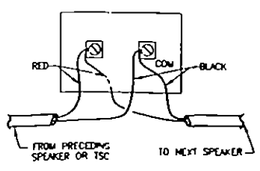


(FOR ALL STROBES EXCLUDING END OF LINE STROBES)

TYPICAL STROBE WIRING DIAGRAM
N.T.S



(FOR END OF LINE SPEAKERS)



(FOR ALL SPEAKERS EXCLUDING END OF LINE SPEAKERS)

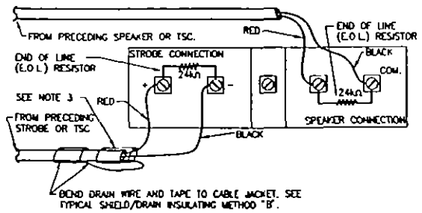
TYPICAL SPEAKER WIRING DIAGRAM
N.T.S.

NOTES:

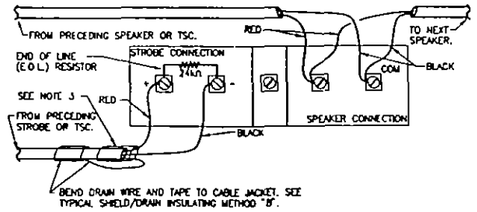
1. FOR LEGEND/SPECIFICATION, CIRCUIT LEGEND, TERMINATION LEGEND, ABBREVIATIONS AND GENERAL NOTES, SEE DRAWING REF-E-1.
2. WIRING DIAGRAMS SHOWN ARE SCHEMATIC REPRESENTATIONS FOR CONNECTIONS ONLY FOR DEVICE INSTALLATION, REFER TO INSTALLATION DETAILS ON DRAWING REF-E-2.
3. INSULATE SHIELD & DRAIN WIRE AS SHOWN ON TYPICAL SHIELD/DRAIN INSULATING METHOD
4. SHIELD MUST BE CONTINUOUS AND INSULATED FROM BOXES, CONDUITS, ETC..
5. INTERFACE TENANT FIRE ALARM SYSTEMS BY UTILIZING INTERFACING RELAY (TRI-B6D) AND CONNECTING TO LOOP DEVICE CIRCUIT ALD-TEN1 OR ALD-TEN2 AS FOLLOW.

ONE ATC
TEN1 - FOR NORTH OF MAIN CORRIDOR
TEN2 - FOR SOUTH OF MAIN CORRIDOR

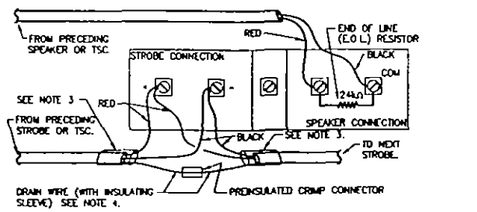
TWO ATC
TEN1 - FOR WEST OF MAIN CORRIDOR
TEN2 - FOR EAST OF MAIN CORRIDOR.



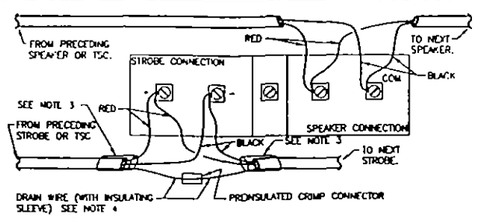
(FOR END OF LINE STROBES AND END OF LINE SPEAKERS)



(FOR END OF LINE STROBES AND ALL SPEAKERS EXCLUDING END OF LINE SPEAKERS)



(FOR ALL STROBES EXCLUDING END OF LINE STROBES AND END OF LINE SPEAKERS)



(FOR ALL STROBES EXCLUDING END OF LINE STROBES AND ALL SPEAKERS EXCLUDING END OF LINE SPEAKERS)

TYPICAL STROBE/SPEAKER COMBINATION UNIT WIRING DIAGRAM
N.T.S

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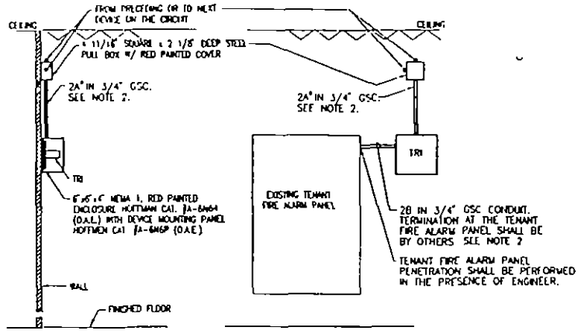
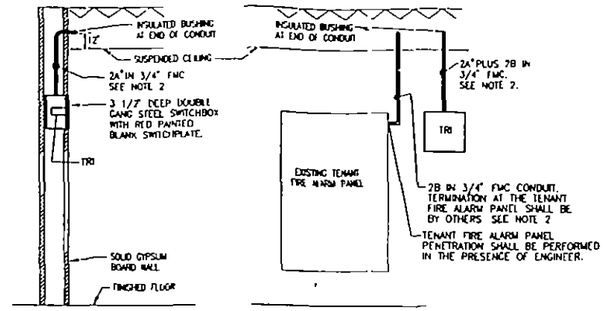


* - ONLY 1A REQUIRED, IF TRI IS END OF LINE DEVICE.

SIDE VIEW FRONT VIEW

TYPICAL SURFACE MOUNTED TRI INSTALLATION DETAIL "J" (NEAR EXISTING SURFACE MOUNTED TENANT F.A. PANEL)

N.T.S



* - ONLY 1A REQUIRED, IF TRI IS END OF LINE DEVICE.

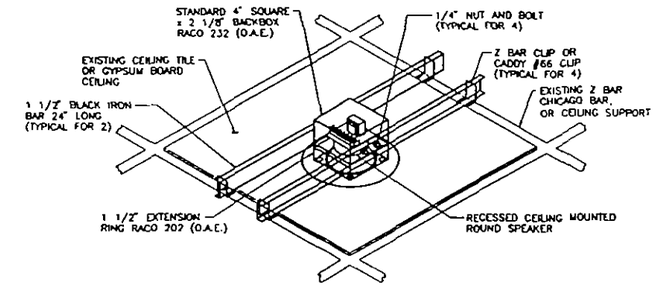
SIDE VIEW FRONT VIEW

TYPICAL FLUSH MOUNTED TRI INSTALLATION DETAIL "I" (NEAR EXISTING FLUSH MOUNTED TENANT F.A. PANEL)

N.T.S.

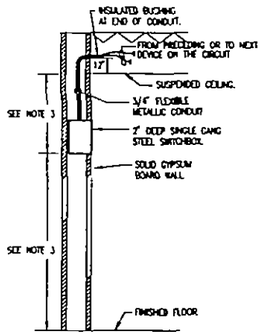
NOTES:

1. FOR ABBREVIATIONS, TERMINATION & CIRCUIT LEGEND, GENERAL NOTES AND LEGEND/ SPECIFICATION, SEE DWG E-1.
2. FOR WIRING DIAGRAMS, SEE DWG E-3.
3. CONTRACTOR SHALL INSTALL THE FIRE ALARM DEVICE AT 80" ABOVE FINISHED FLOOR OR 6" BELOW SUSPENDED CEILING, WHICHEVER IS LOWER
4. RETURN AIR SMOKE DETECTORS SHALL BE MOUNTED 6' IN FRONT OF THE RETURN AIR GRILL



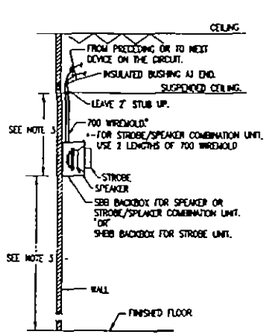
TYPICAL RECESSED SPEAKER INSTALLATION DETAIL "A"

N.T.S



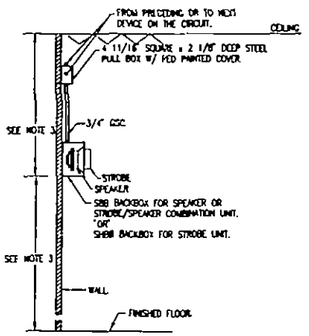
TYPICAL FLUSH MOUNTED STROBE INSTALLATION DETAIL "B"

N.T.S.



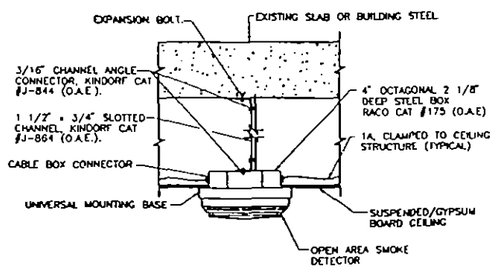
TYPICAL SURFACE MOUNTED (FOR OFFICE AREA) STROBE, SPEAKER OR COMBINATION INSTALLATION DETAIL "C"

N.T.S.



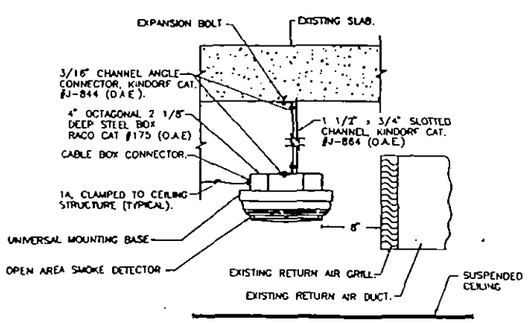
TYPICAL WALL MOUNTED (FOR MER TYPE AREA) STROBE, SPEAKER OR COMBINATION INSTALLATION DETAIL "D"

N.T.S.



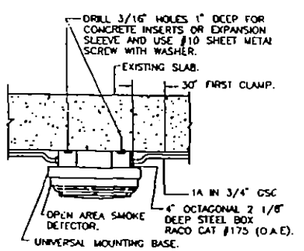
SMOKE DETECTOR INSTALLATION DETAIL "E" (FOR SUSPENDED CEILING)

N.T.S.



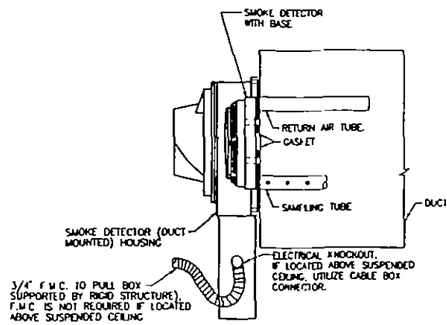
SMOKE DETECTOR INSTALLATION DETAIL "F" (IN FRONT OF RETURN AIR GRILL)

N.T.S.



SMOKE DETECTOR INSTALLATION DETAIL "G" (FOR OPEN CEILING)

N.T.S



SMOKE DETECTOR INSTALLATION DETAIL "H" (DUCT MOUNTED IN HOUSING W/ SAMPLING TUBE)

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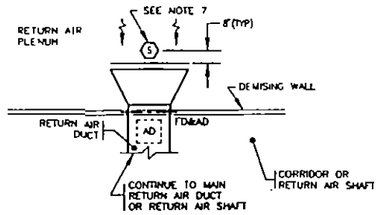
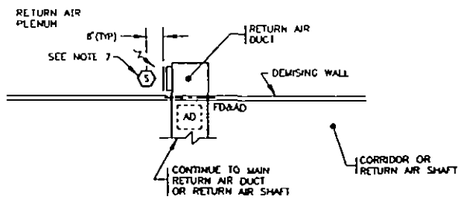
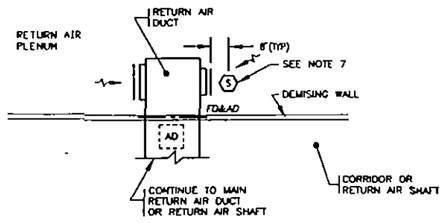


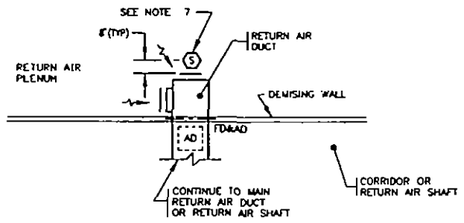
TYPICAL ARRANGEMENT PART PLAN "1A"



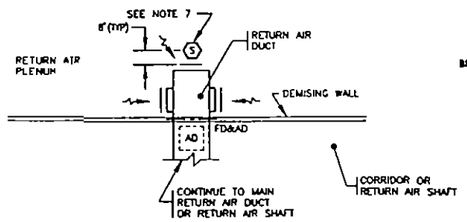
TYPICAL ARRANGEMENT PART PLAN "1B"



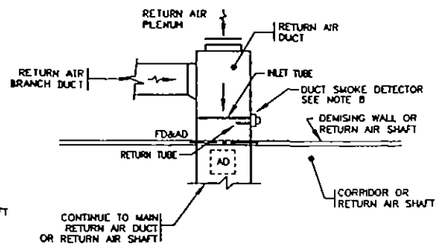
TYPICAL ARRANGEMENT PART PLAN "2A"



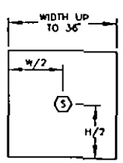
TYPICAL ARRANGEMENT PART PLAN "2B"



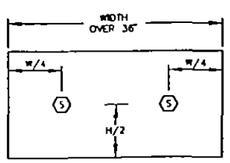
TYPICAL ARRANGEMENT PART PLAN "3"



TYPICAL ARRANGEMENT PART PLAN "4"



TYPICAL ARRANGEMENT ELEVATION "X"



TYPICAL ARRANGEMENT ELEVATION "Y"

SAMPLING TUBE SCHEDULE			
DUCT WIDTH RANGE	MODEL	ACTUAL TUBE LENGTH	REMARKS
0' - 1'-0"	STA-2	2 FT.	PYROTRONICS AS STANDARD
1'-0" - 3'-3"	STA-3	3 FT - 6 IN.	
3'-3" - 6'-3"	STA-6	6 FT. - 6 IN	
6'-3" - 9'-9"	STA-10	10 FT.	

NOTE, IF NECESSARY, TRIM THE INLET SAMPLING TUBE PER MANUFACTURERS RECOMMENDATIONS.

LEGEND	
	INSTALL NEW
	EXISTING DUCTWORK
W	EXISTING VOLUME DAMPER
FD&AD	EXISTING DUCT WITH FIRE DAMPER
	EXISTING DUCT WITH RETURN GRILLE
FD&AD	FIRE DAMPER AND ACCESS DOOR
S	NEW SMOKE DETECTOR
FD	FIRE DAMPER
H	DUCT HIGHT
W	DUCT WIDTH
AD	EXISTING ACCESS DOOR

RETURN AIR SMOKE DETECTORS INSTALLATION NOTES.

1. SMOKE DETECTORS ARE TO BE INSTALLED AT EACH CONNECTION TO THE RETURN AIR SHAFTS ABOVE THE FINISHED HUNG CEILING, EITHER IN FRONT OF THE RETURN AIR GRILLE OPENING(S) OR WITHIN THE RETURN AIR DUCT, AS INDICATED ON THIS DRAWING. THE RETURN AIR SHAFTS ARE LOCATED AT THE FOUR QUADRANTS OF THE CORE AREA ON EACH TENANT FLOOR REFER TO THE REFERENCE WORLD TRADE CENTER MECHANICAL BASE BUILDING DRAWINGS FOR THE LOCATIONS OF THE RETURN AIR SHAFTS ON EACH TENANT FLOOR
2. REFER TO ELECTRICAL DRAWINGS FOR LOCATIONS, DETAILS AND SPECIFICATIONS OF THE SMOKE DETECTORS. THE CONTRACTOR SHALL FURNISH AND INSTALL ALL SMOKE DETECTORS IDENTIFIED ON THE ELECTRICAL DRAWINGS AND ADDITIONAL SMOKE DETECTORS AS MAY BE REQUIRED AS A RESULT OF THE CONTRACTOR'S FIELD SURVEY (SEE NOTE #3) AND IN CONFORMANCE WITH THE NOTES ON THIS DRAWING. THE INSTALLATION OF ADDITIONAL SMOKE DETECTORS THAT ARE NOT IDENTIFIED ON THE ELECTRICAL DRAWINGS ARE TO BE PERFORMED UNDER THE "NET COST" PROVISIONS OF THIS CONTRACT.
3. THE CONTRACTOR SHALL FIELD SURVEY THE LOCATIONS AND SIZES OF THE RETURN AIR DUCTS AND GRILLE OPENINGS ABOVE THE FINISHED HUNG CEILING TO VERIFY AND DETERMINE THE LOCATIONS AND THE NUMBER OF SMOKE DETECTORS BASED ON THE CRITERIA SET FORTH BY THE NOTES ON THIS DRAWINGS. THE CONTRACTOR SHALL NOTIFY THE ENGINEER OF ANY DEVIATION FROM THE TYPICAL ARRANGEMENT PART PLANS DUE TO ACTUAL FIELD CONDITIONS.
4. PRIOR TO THE INSTALLATION OF ADDITIONAL SMOKE DETECTORS THAT ARE NOT IDENTIFIED ON THE ELECTRICAL DRAWINGS, THE CONTRACTOR SHALL RECEIVE APPROVAL FROM THE ENGINEER. THE CONTRACTOR SHALL PROGRAM THE ADDITIONAL SMOKE DETECTORS WITH ADDRESSES TO BE ASSIGNED BY THE ENGINEER.
5. ALL SMOKE DETECTORS SHALL BE INSTALLED IN CONFORMANCE WITH MANUFACTURER'S RECOMMENDATIONS, OR AS APPROVED BY THE ENGINEER.
6. SMOKE DETECTORS TO BE INSTALLED IN FRONT OF RETURN AIR GRILLE OPENINGS SHALL BE DESIGNED FOR HIGH AIR VELOCITY APPLICATION, WITH A RANGE FROM 0 TO 1,200 FEET PER MINUTE, AS SPECIFIED ON THE DRAWING E-1. SMOKE DETECTORS TO BE INSTALLED WITHIN DUCTWORK SHALL BE DESIGNED FOR A HIGH VELOCITY OF 500 TO 4000 FEET PER MINUTE, AS SPECIFIED ON DRAWING E-1.
7. FOR RETURN AIR GRILLE OPENING ASSOCIATED WITH DUCTWORK THAT EXTENDS LESS THAN 15 FEET FROM THE RETURN AIR SHAFT, SMOKE DETECTOR(S) SHALL BE INSTALLED IN THE CEILING PLENUM, 8" IN FRONT OF THE RETURN AIR GRILLE OPENING, AND AT THE CENTERLINE OF THE OPENING HEIGHT FOR RETURN AIR GRILLE OPENING OF A WIDTH EQUAL OR LESS THAN 36", PROVIDE ONE (1) SMOKE DETECTOR AS SHOWN ON TYPICAL ARRANGEMENT ELEVATION "X". FOR RETURN AIR GRILLE OPENING OF A WIDTH GREATER THAN 36", PROVIDE TWO (2) SMOKE DETECTORS AS SHOWN ON TYPICAL ARRANGEMENT ELEVATION "Y". IN ADDITION, THE PLACEMENT OF THE SMOKE DETECTOR(S) FOR THE DIFFERENT RETURN AIR GRILLE CONFIGURATIONS SHALL BE AS FOLLOWS:
   A. FOR RETURN AIR DUCT WITH A SINGLE RETURN AIR GRILLE OPENING, INSTALL SMOKE DETECTOR(S) AS SHOWN ON TYPICAL ARRANGEMENT PART PLANS "1A" AND "1B"
   B. FOR RETURN AIR DUCT WITH TWO (2) RETURN AIR GRILLE OPENINGS, SMOKE DETECTOR(S) SHALL ONLY BE INSTALLED IN FRONT OF THE SMALLER OPENING AS SHOWN ON TYPICAL ARRANGEMENT PART PLANS "2A" AND "2B".
   C. FOR RETURN AIR DUCT WITH THREE (3) RETURN AIR GRILLE OPENINGS, SMOKE DETECTOR(S) SHALL ONLY BE INSTALLED IN FRONT OF THE CENTER OPENING AS SHOWN ON TYPICAL ARRANGEMENT PART PLAN "3"
8. FOR ANY RETURN AIR DUCTWORK THAT HAS NO GRILLE OPENING ABOVE THE FINISHED HUNG CEILING OR HAS A TOTAL LENGTH OF 15 FEET OR MORE FROM THE RETURN AIR SHAFT, DUCT MOUNTED SMOKE DETECTOR(S) SHALL BE INSTALLED AT THE CENTER LINE OF THE DUCT HEIGHT AND AS CLOSE AS POSSIBLE TO SIX (6) DUCT WIDTHS FROM THE NEAREST RETURN AIR INLET OR BRANCH DUCT. SELECTION OF SAMPLING TUBE LENGTH SHALL BE AS INDICATED IN THE SAMPLING TUBE SCHEDULE.
9. DO NOT INSTALL SMOKE DETECTORS AT TRANSFER AIR OR SUPPLY AIR OPENINGS.
10. ANY WORK TO BE PERFORMED THAT REQUIRES AN HVAC EQUIPMENT SHUTDOWN OR INTERRUPTION TO NORMAL OPERATION SHALL BE PERFORMED DURING OFF-HOURS, OR AS DIRECTED BY THE ENGINEER. THE CONTRACTOR SHALL NOTIFY THE AUTHORITY OF ANY EQUIPMENT SHUTDOWN 48 HOURS PRIOR TO THE FIELD WORK
11. UPON COMPLETION OF FIELD WORK, THE CONTRACTOR SHALL MARK-UP AND SUBMIT A SET OF CONTRACT DRAWINGS INDICATING THE LOCATIONS AND ADDRESSES OF ALL SMOKE DETECTORS INSTALLED BY HIM, INCLUDING THE DIMENSIONS AND CONFIGURATIONS OF ALL RETURN AIR DUCTS AND GRILLE OPENINGS WHERE SMOKE DETECTORS ARE REQUIRED

Sheet of

ISSUES

No.	Date	Revision	Approved

SAMPLE

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Title

Designed by Drawn by Checked by

Date

Contract Number Drawing Number